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MAINTENANCE MANUAL FOR NATICK'S FOOTWEAR DATABASE

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Natick's Footwear Database is a computerized system for the management of literature regarding lower extremity health and comfort as they relate to footwear. Six major topics define the focus and the contents of the database. These are: (1) anatomy; (2) biomechanics; (3) environment; (4) footwear; (5) injury; and (6) physiology. System capabilities include: text and keyword searches of the literature in the database; presentation on the computer screen of the results of searches; and generation of printed reports of the results of searches. An entry in the database contains the complete reference, the keywords assigned, and an overall summary of the contents. In the case of a paper dealing with an experiment, summaries of the methods employed and the results of the work are also presented. This report contains detailed information regarding the operation of the maintenance version of the footwear database. Included are instructions for installing the database, adding keywords, and updating the database contents by entering new literature or modifying existing entries.

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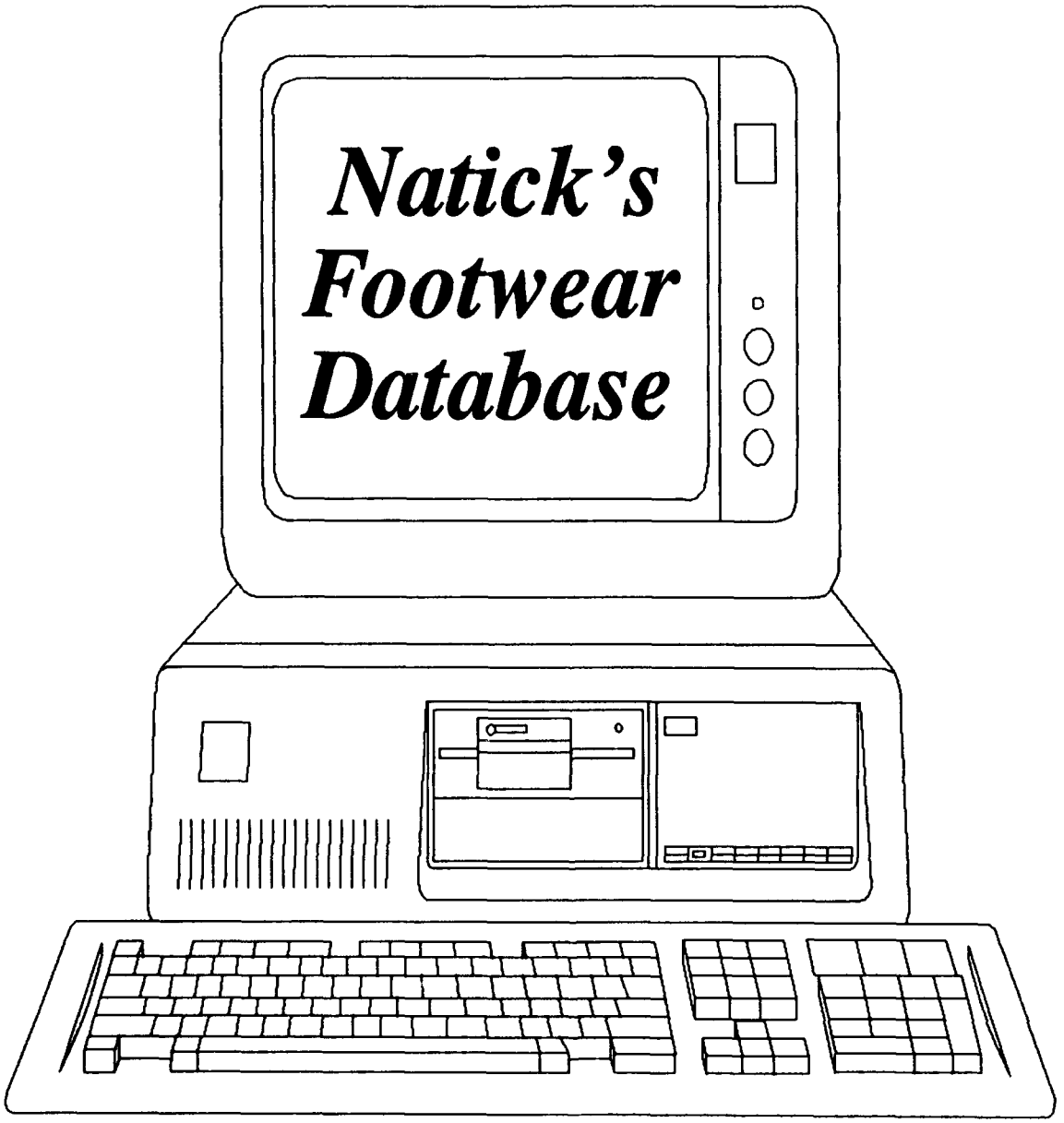

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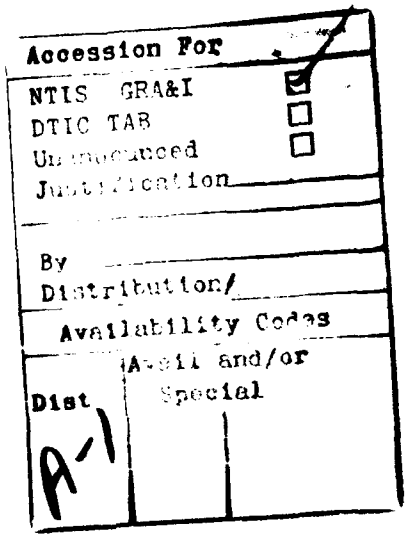

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PREFACE

This report on the operation of Natick's Footwear Database was prepared by Ms. Paula M. Poole and Mr. Richard M. Rosenstein of GEO-CENTERS, INC., Newton Centre, Massachusetts, under Army contract DAAK60-90-D-0002, and by Dr. Carolyn K. Bensel of the Human Factors Branch, Behavioral Sciences Division, Soldier Science Directorate, U.S. Army Natick Research, Development and Engineering Center (Natick).

Establishment of Natick's Footwear Database has been funded by the U.S. Marine Corps Research, Development, and Acquisition Command. The authors wish to thank Captain Kenneth J. Thompson, USMC, and Major R. Stewart Navarre, USMC, who, while serving as U.S. Marine Corps Liaison Officers at Natick, provided invaluable support and encouragement of this effort. The authors are also most grateful to Dr. James A. Vogel and Dr. Everett A. Harman of the U.S. Army Research Institute of Environmental Medicine, Natick, Massachusetts, for their cooperation during the planning and the establishment of the database.

MAINTENANCE MANUAL FOR NATICK'S FOOTWEAR DATABASE

SECTION 1. INTRODUCTION

1.1 Background. The many types of footwear in the supply systems of the U.S. Armed Forces reflect the wide range of environments in which military personnel operate, the myriad hazards that the personnel face, and the variety of occupational specialties that the personnel practice. In the U.S. Army supply system, as an example, there are over 30 items of footwear (Department of the Army, 1986). They include: boots for tropical, desert, and extreme low temperature environments; steel-toed shoes for wear when working around heavy objects; overshoes for use in the presence of toxicological agents; dress shoes for the office; and rubber boots for firefighting.

Regardless of its particular application, each type of military footwear should function to maintain or enhance the lower extremity health and the comfort of the wearer. A number of scientific and technical specialties are employed in arriving at a finished footwear item that will achieve this goal. Expertise in chemistry, materials technology, and engineering is needed, as is expertise in physiology, ergonomics, and physical anthropology. As a Department of Defense establishment responsible for development of military footwear, the U.S. Army Natick Research, Development and Engineering Center (Natick) has on its staff scientists and technologists representing a number of the relevant specialties. The capabilities of the Natick staff are complemented by those of scientists at the U.S. Army Research Institute of Environmental Medicine (USARIEM), a facility that is co-located with Natick.

As a result of their efforts over the years in footwear research and development, the staffs of Natick and of USARIEM have generated a body of literature representing a broad range of footwear-related issues. Much of this literature is in the form of Natick and USARIEM technical reports that reside in the permanent collection cf the Natick Technical Library. Also part of the

collection are reports prepared by universities, commercial research establishments, and industrial concerns under contract to Natick or to USARIEM. The library holdings include, in addition, reports of work carried out under Natick auspices by other government agencies. Although the literature is at hand, the sheer volume of it presents a daunting challenge to the individual trying to assemble information on a given topic. The situation is, of course, exacerbated when one is naive to the topic, as a new staff member may be.

Other sources of footwear-related information at Natick and at USARIEM are the literature collections, principally comprised of books, journal papers, and government technical reports, that individual staff members have assembled as reference material for their footwear projects. These literature collections, which can become quite sizeable, are unique to each individual, representing background information related to their particular areas of study. It is highly probable that a given piece of literature in one individual's collection would be of use to a number of staff members, yet they might not know of its existence. Indeed, as the volume of reference material increases, the individual whose collection already includes a particular paper may overlook it as a source of information.

In order to address the inefficiencies involved in locating relevant references and to exploit the literature available at Natick and at USARIEM, particularly the collection of the Natick Technical Library, the determination was made to establish a computerized database of footwear literature. The database was planned to serve as a resource for Natick and USARIEM staff members, both those experienced in and those new to footwear-related research and development, and for members of the U.S. Marine Corps and the U.S. Army responsible for formulating the footwear needs of their respective services. However, the database may also be of use to individuals in other Department of Defense agencies and to government contractors involved with footwear.

As of this writing, the software for running the database is in place and there are over 100 entries consisting of reference and textual information. The project has, therefore, reached a stage at which staff members may benefit from the database. In order for interested individuals to exercise the database, two reports, a user manual (Poole, Bensel, and Rosenstein, 1992) and this maintenance manual, have been prepared. In the sections that follow, the focus of the database is described, and detailed instructions for operation of the database are presented.

The literature now in the database is from the collections of Natick and USARIEM staff members. The literature consists of books, journal papers, and government technical reports. The next effort will be to add holdings from the Natick Technical Library. The foundation of the database will have been established when this is accomplished, and it is expected that future work will consist of keeping the database current by adding newly-published literature.

1.2 Focus of the Database and Major Topics. The development of footwear involves the application of many technical specialties and, thus, there is a broad array of literature related to the topic. Early in the planning process, it was decided that the footwear database would be comprised of literature that is relevant across technical disciplines. A goal that drives all military footwear development efforts, regardless of discipline, is maintaining or enhancing the lower extremity health and the comfort of the wearer. Therefore, literature dealing with lower extremity health and with comfort as related to footwear was chosen as the focus of the database.

In an undertaking of this kind, decisions made regarding appropriate subject matter are admittedly arbitrary. They reflect the judgments of those who establish and, subsequently, of those who maintain the database. In addition, changes in the state of the art and pursuit of new lines of research or development may

affect the composition of the database. However, at this stage, six major topics define the focus and the contents of the database. These are:

a. Anatomy -- Information regarding the physical structure of the human body, with emphasis on the lower extremities.

b. Biomechanics -- Information regarding human movement and the effects of internal and external forces acting on the human body. Descriptions of research techniques are included.

c. Environment -- Information regarding the effects that thermal conditions and the characteristics of terrain surface composition have on the body, particularly the lower extremities. Information on designing of footwear to protect against environmental effects is also included.

d. Footwear -- Information regarding material properties, fabrication techniques, and finished footwear items.

e. Injury -- Information regarding etiology, diagnosis, and treatment of physical problems, with emphasis on lower extremity disorders. Also included here is information on morbidity to injury in military and civilian populations.

f. Physiology -- Information regarding physical functioning of the body during activities involving the lower extremity.

There is a seventh topical area, labelled "Other," containing assorted materials judged to be appropriate for inclusion in the database that cannot be properly accommodated in the six major areas.

1.3 General Information on Operation and Administration.

1.3.1 Purpose of the System. The purpose of Natick's Footwear Database is to manage information related to footwear and lower extremity health. Capabilities include text and keyword searches, on-screen viewing, and generation of printed reports. Depending on the user's requirements, the database is capable of displaying information on the screen or generating output in the form of a reference list or a detailed report including summaries of the literature.

1.3.2 Additional Documentation. The following documents may be necessary for the operation of Natick's Footwear Database. Under normal conditions, however, consulting these documents should not be required.

a. Manual(s) for host PC and printer.
b. Manual(s) for host operating system (DOS).

1.3.3 Maintenance of Data. It is projected that the contents of Natick's Footwear Database will be maintained by personnel in the Behavioral Sciences Division of the Soldier Science Directorate. Individual users will not be able to modify or augment the database. However, suggestions are welcome; a form is available for such comments in Appendix A.

1.3.4 The Maintenance Manual. The purpose of this manual is to provide database maintenance personnel with the information necessary to operate the "Development" version of the database system effectively.

1.3.5 Security. The literature contained in Natick's Footwear Database is unclassified. The inclusion of classified documents is not permitted. A password is required to operate the development version of the database (see Section 3.2, Initiating a Session).

1.3.6 Availability of the Literature in the Database. Users outside of Natick and USARIEM may want to acquire documents summarized in the database. They should follow their usual procedures for acquiring such materials. THE STAFFS OF NATICK AND USARIEM AND THE NATICK TECHNICAL LIBRARY CANNOT PROVIDE THE LITERATURE SUMMARIZED IN THE DATABASE.

If an organization is registered with the Defense Technical Information Center (DTIC), members of the organization may obtain technical reports published by the Department of Defense (DoD) and DoD contractors by contacting:

Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22304-6145

Phone
Commercial: (202) 274-7633
DSN: 284-7633

Others interested in obtaining DoD technical reports should contact:

U.S. Department of Commerce
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, Virginia 22161

Phone
Commercial: (703) 487-4650

To assist users in obtaining technical reports, the database contains, as part of the reference to such reports, the accession code, or "DTIC" number, used as an identifier by both DTIC and NTIS.

SECTION 2. SYSTEM SUMMARY

2.1 Overview.

2.1.1 Application Summary. Each literature entry, or record, in Natick's Footwear Database contains reference and textual information. The textual information includes an overall summary, or synopsis, of the literature entry. It may also include summaries of the methods and the results and some comments on the entry. The user interface allows individuals who are interested in footwear and foot health to gain access to the contents of the database. Users are offered two major types of search functions: a text search and a keyword search. After successfully conducting either type of search, the user is given a list of literature that meets the demands of the search specifications. The user can view the contents of each entry on the screen or generate printed output. The development version of Natick's Footwear Database allows database maintenance personnel to edit existing records and add new literature to the database.

2.1.1.1 Conducting a Text Search. The "Text Search" allows the user to enter text in the form of a partial word, word, phrase, sentence, or several sentences. The text may be located in one or more of the following fields: title, author(s), editor(s), year, organization, journal, overall summary, methods summary, and results summary.

2.1.1.2 Conducting a Keyword Search. The "Keyword Search" allows the user to choose one or more major topics of interest. Under each major topical area, the system offers the user a predefined list of applicable keywords. The user can choose up to six keywords from one or more major topics. Before conducting a search, the user connects the keywords with a logical "and" or a logical "or."

2.1.1.3 On-screen Viewing. Once a text or keyword search has been conducted, the user is presented a list of the titles of the matched references. The user may view the title that is currently highlighted in the list of matches. Viewing a title displays three screens of information, including all applicable reference information and keywords assigned to that title. One of the screens has a description of the user's options to open windows containing summaries. On-screen viewing while using the development version of the system allows keyword data to be changed or augmented; all other data is unchangeable.

2.1.1.4 Printed Output. The user may generate one or more printed reports. Each report consists of either a single title that is currently highlighted in the list of matches or all titles in the list of matches. Also, the user may generate either a reference report or a detailed report. The reference report contains reference information for the chosen literature, whereas the detailed report contains reference information as well as keywords and any applicable textual summaries for the chosen literature.

2.1.1.5 General System Flowchart.

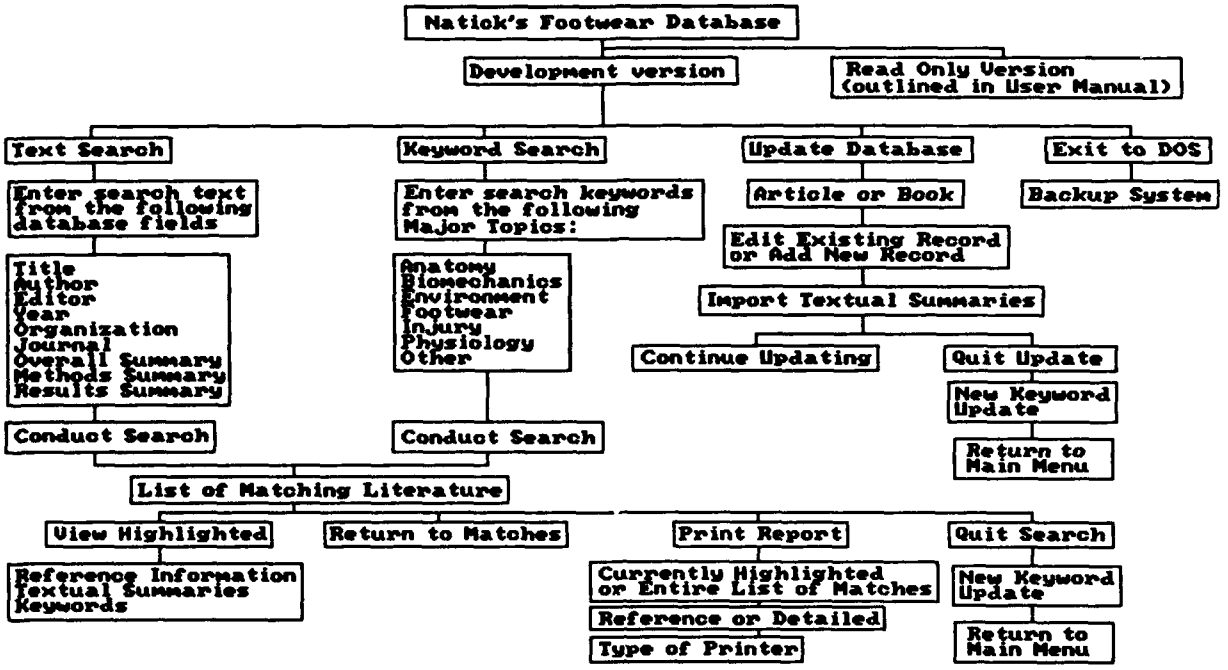

Figure 1. General system flowchart.

2.1.2 Performance. The following section describes system performance capabilities based on the number of records entered in the database at the time this report was published. Sample text and keyword search performance times are presented in Table 1.

Table 1. Performance Capabilities of Natick's Footwear Database.

Text Searched for in Title	38 records (time in seconds)	73 records (time in seconds)
no text specified	50	75
"a"	50	67
"y"	30	44
"Load"	18	18
"Load, sport shoes and playing surfaces"	15	15

	38 records (time in seconds)		73 records (time in seconds)	
	Logical		Logical	
Keywords	"and"	"or"	"and"	"or"
no keywords specified	30	13	45	17
1 keyword	11	5	11	5
6 keywords	15	35	15	44

2.1.3 Controls. Personnel in the Behavioral Sciences Division of the Soldier Science Directorate are responsible for managing the system and providing supervisory controls.

2.2 System Environment.

2.2.1 Hardware Required. A 286 or 386 IBM compatible computer with a color monitor, a minimum of 640K of memory and 3MB of hard

disk space is necessary to run the system. (Hard disk requirements may increase as the database is further developed.) It should be noted that memory resident programs such as shells may consume memory required to properly run the system. Neither expanded memory (EMS) nor a math coprocessor is required. However, FoxPro will make full use of any available EMS or a math coprocessor. Disk caches, however, should not be active while using the system due to their incompatibility with FoxPro software. Although some types of caches, such as small sized ones loaded on 386 machines, may not present any problems, testing in this area has not lead to a conclusive list of "safe" caches. **THE USE OF SOME TYPES OF DISK CACHES WHILE OPERATING THE DEVELOPMENT VERSION OF THE SYSTEM MAY RESULT IN DATA CORRUPTION AND/OR PROGRAM EXECUTION ERRORS.** A printer is not required to use the system for conducting searches and viewing literature. A printer, however, is required if printed reports are desired.

2.2.2 Software Required. DOS version 3.31 or higher is necessary to support the operation of Natick's Footwear Database. However, DOS version 4.01 should be used by maintenance personnel due to the fact that files backed up with DOS version 4.01 are compatible with systems running on earlier versions of DOS, whereas files backed up with earlier versions of DOS cannot be successfully restored to systems running on DOS 4.01 or higher. Specific requirements for DOS settings, such as files and buffers statements, are described in Appendix B. Consulting this appendix should only be necessary if installation is required. The files needed to run Natick's Footwear Database are on System, Keywords, Database, and Text Diskettes. Included on the System Diskettes is a copy of the Royalty-Free Run-Time version of FoxPro (v 1.02), licensed by Fox Software, Inc. of Perrysburg, OH, as well as installation files, compiled programs, report formats, and screen formats. The Keywords Diskette holds the files that make up the keywords lists for the major topics. Included on the Database Diskette(s) is the file containing all reference information and keywords assigned to

each record. The Text Diskettes hold the file containing all textual summaries for each record. A complete listing of diskette contents is located in Appendix B.

2.3 Contingencies and Alternate Modes of Operation. N/A

2.4 Assistance and Problem Reporting. While using the system, assistance may be required or a problem may need to be reported. If the present report does not address the user's needs, the following guidelines should be of assistance.

A Suggestion and Comment Form is available in Appendix A of this manual. Users are encouraged to use these forms to voice suggestions and/or comment on any problems encountered while using the system. If the system is being used on a PC targeted as Natick's Footwear Database Workstation, completed forms may be left at the workstation. If the system has been loaded on any other PC, completed forms may be returned to personnel responsible for distributing the system software. Maintenance personnel are responsible for the management of such reported problems or suggestions.

SECTION 3. ACCESS TO THE SYSTEM

3.1 Use of the System.

3.1.1 Access Control. In order to protect the integrity of the database, the capability for the typical user to modify or supplement existing data is not available. Initial entry screens to the system require users to choose between a "Read Only" version or a "Development" version. The typical user would choose the read only version, whereas database maintenance personnel would choose the development version. Access to the development version requires the use of a password, the details of which are explained in Section 3.2 of this manual.

3.1.2 Installation. Under normal conditions, the database will be used on a PC where it has already been installed. Should software installation be necessary, instructions are located in Appendix B.

3.2 Initiating a Session. To begin a working session with Natick's Footwear Database, the user must change to the directory in which the system has been installed, type *foot*, and press ↵ (see Table 2 for instructions).

Table 2. Initiating a Session.

What To Type:	What Will Happen:
C:\>*cd \footwear* ↵	Changes to the directory where the system resides.
C:\footwear>*foot* ↵	Executes start-up file for the system.

The first screen welcomes the user to Natick's Footwear Database (see Figure 2). Pressing any key continues the initial

entry procedure with a screen that requests the user to choose between a read only version and a development version as previously described in Section 3.1.1, Access Control (see Figure 3).

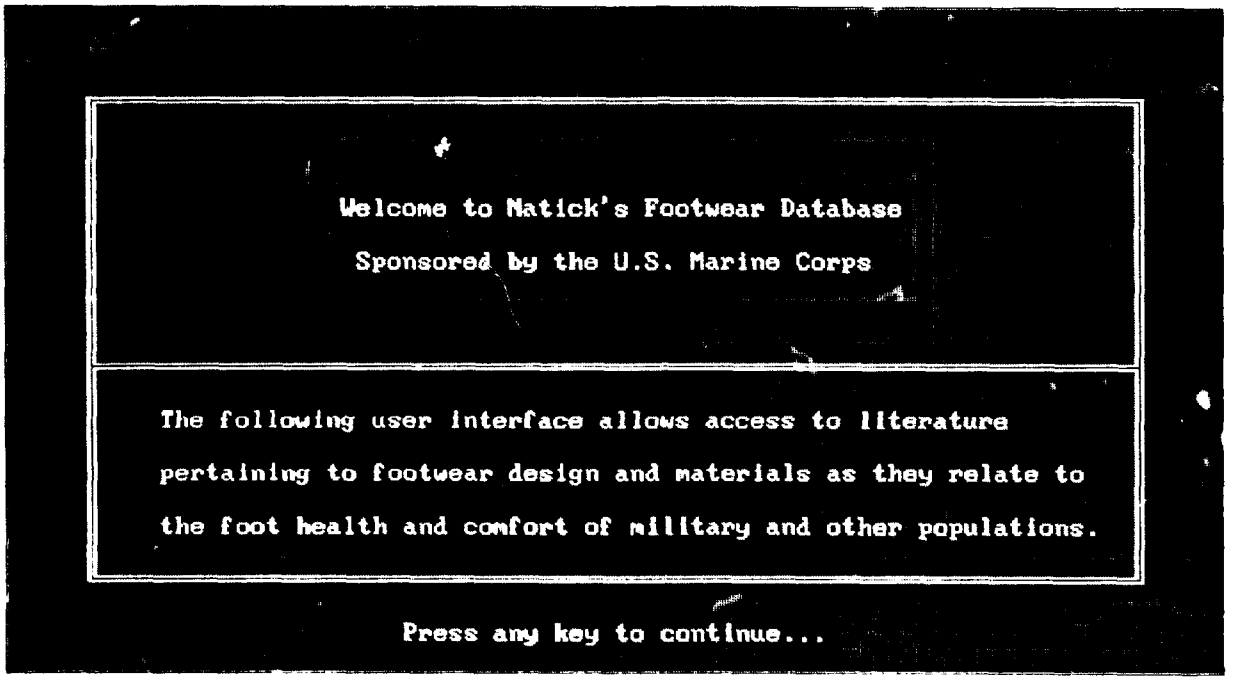

Figure 2. Welcoming screen for Natick's Footwear Database.

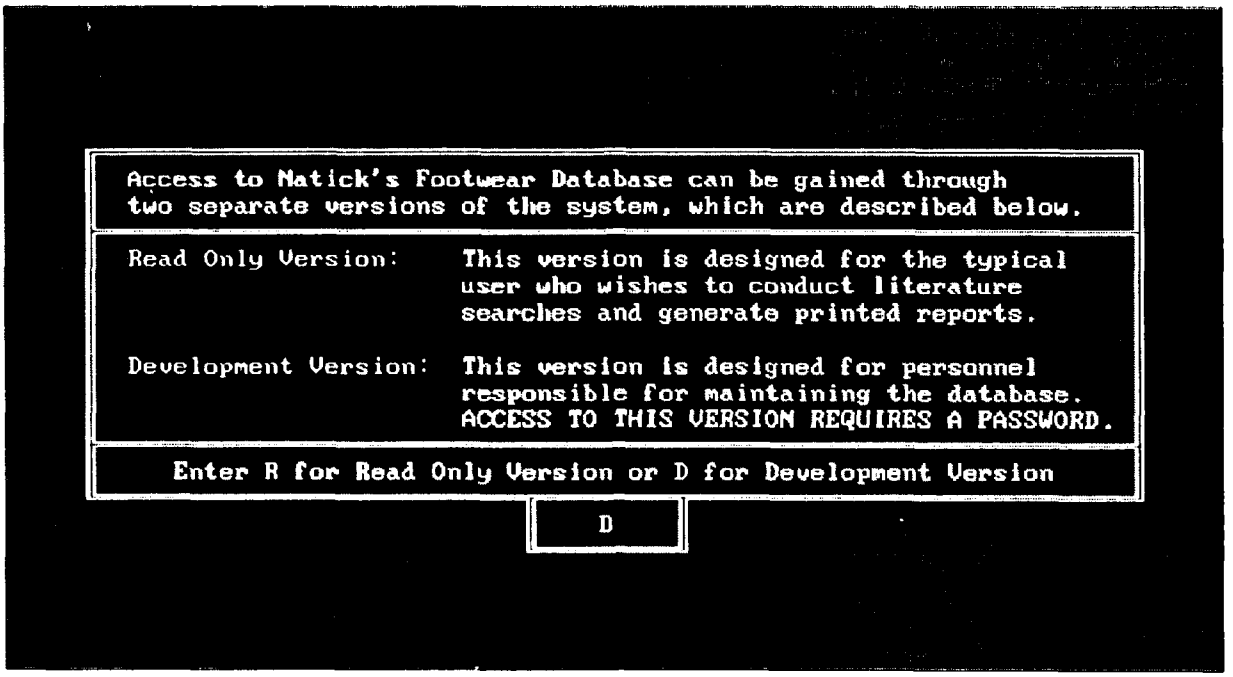

Figure 3. Choosing between "Read Only" or "Development" versions.

Once the development version has been selected by entering **D**, the system displays a screen that prompts the user to enter a password (see Figure 4). The password, not appearing in this report, should be obtained from authorized personnel in the Behavioral Sciences Division of the Soldier Science Directorate. Upper and lower case letters in the password should be entered exactly as they appear. If the password is entered incorrectly, the system displays an appropriate message and allows the user another chance to enter it correctly. After three incorrect password entries, the system terminates. Once the password has been entered correctly, the system begins a working session with the main menu displayed and ready for use. Consult Section 4, Processing Reference Guide, for complete development version operating instructions.

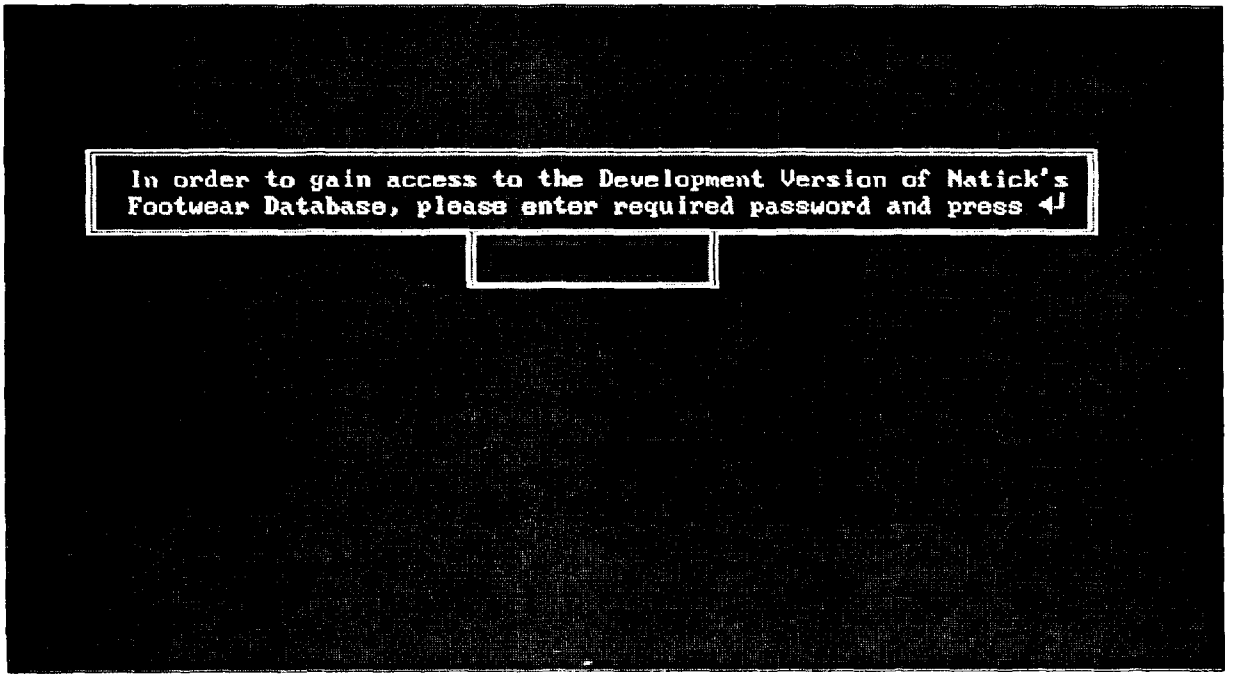

Figure 4. Password entry screen.

3.3 Stopping and Suspending Work. The proper way to interrupt use of the system is to exit from the main menu by using the "Exit" option. **REBOOTING OR POWERING DOWN THE COMPUTER SHOULD NOT BE USED AS METHODS OF EXITING THE SYSTEM.** These methods do not shut down the system properly; they leave temporary files that should be deleted in the system directory. If this happens, subsequent use of the system will generate error messages. A list of error messages and suggested corrective actions is presented in Appendix C.

SECTION 4. PROCESSING REFERENCE GUIDE

4.1 Capabilities. The main menu offers a text search, a keyword search, an update option, and an exit option. After conducting either type of search, a list of matching literature titles is displayed with options to view references and/or summaries on the screen, generate reference and/or textual output to a printer, or quit the search.

4.2 Conventions. Natick's Footwear Database was designed to run on a PC with a color monitor. Operation with a monochrome monitor is possible, but not desirable due to lack of contrast while using the system's menus and windows. The main color of the system is blue with contrasting red, yellow, cyan, and white graphics and text. On-screen instructions generally appear at the bottom of the screen. Keystrokes required to operate the system are limited to text characters, ↵, **<Esc>**, **Delete**, **Backspace**, ↑ ↓ ← →, **<PgUp>**, **<PgDn>**, **Home**, **End**, **<F2>**, **<F3>**, **<F4>**, and **<F10>**. A cursor, appearing as a white or yellow blinking underbar, usually is waiting for text input or another keystroke. The insert mode is automatically turned on at the beginning of each session, but it can be manually turned off by pressing insert (this will leave the computer in a "typeover" mode). When menus are accessed, the active option is denoted by a light bar which is a red rectangle with yellow text. Non-active menu options are presented in cyan text with no contrasting rectangle. Some of the system's menus employ the use of "hot keys." Hot keys appear in a different color and are used as a shortcut to both selecting and activating a menu item. Normally, without hot keys, the user would scroll to the desired menu option using ↑ ↓, **<PgUp>** or **<PgDn>** and then press ↵ to activate it. With hot keys, the user can press a key letter in the title of the menu option (usually the first letter) to perform the functions of multiple keystrokes. Although hot keys are more efficient, the examples in this report utilize the arrow and return keys for choosing options.

4.3 Processing Procedures. Instructions for each type of main menu option are described below. Section 4.3.1 describes text searches; Section 4.3.2 describes keyword searches; Section 4.3.3 describes viewing and printing options available after conducting a text or keyword search; Section 4.3.4 describes updating the database; and Section 4.3.5 describes exiting the system.

4.3.1 Text Search. To conduct a text search, highlight "Text Search" on the main menu by using ← → and press ↵ (see Figure 5).

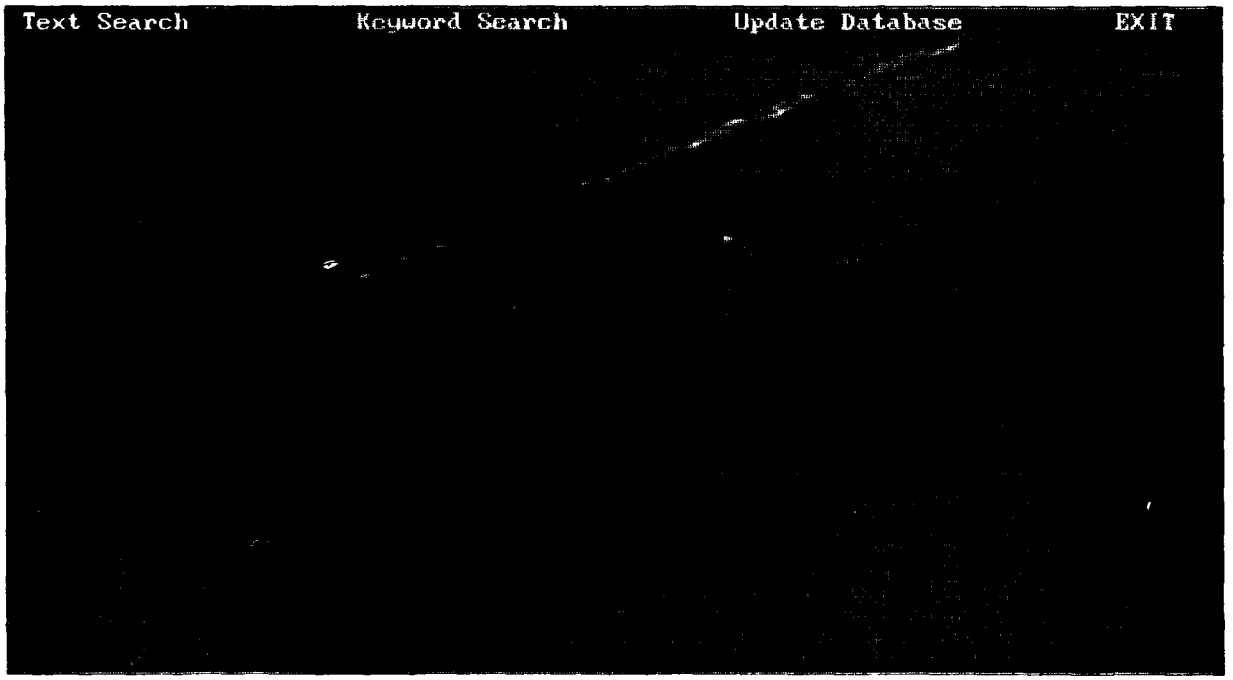

Figure 5. Main menu with "Text Search" highlighted.

The text search offers the user a chance to search for all literature containing specified text anywhere in one or more of the following fields: title, author(s), editor(s), year, organization, journal, overall summary, methods summary, and results summary (see Figure 6). Table 3 describes each searchable database field and the acceptable entry forms. The case of the characters (upper or lower) entered for a search text does not have to match the case of the characters stored in the database.

Table 3. Searchable Database Fields with Acceptable Entry Forms.

Database Field:	Entry Form:
Title	up to 252 characters
Author	last name only; up to 35 characters
Editor	last name only; up to 35 characters
Year	four digit years only; entering both a starting and ending year defines a specific range; entering only a starting year defines a range that is greater than or equal to the starting year; entering only an ending year defines a range that is less than or equal to the ending year
Organization	up to 252 characters
Journal	up to 126 characters
Overall Summary	up to 252 characters
Methods Summary	up to 252 characters
Results Summary	up to 252 characters

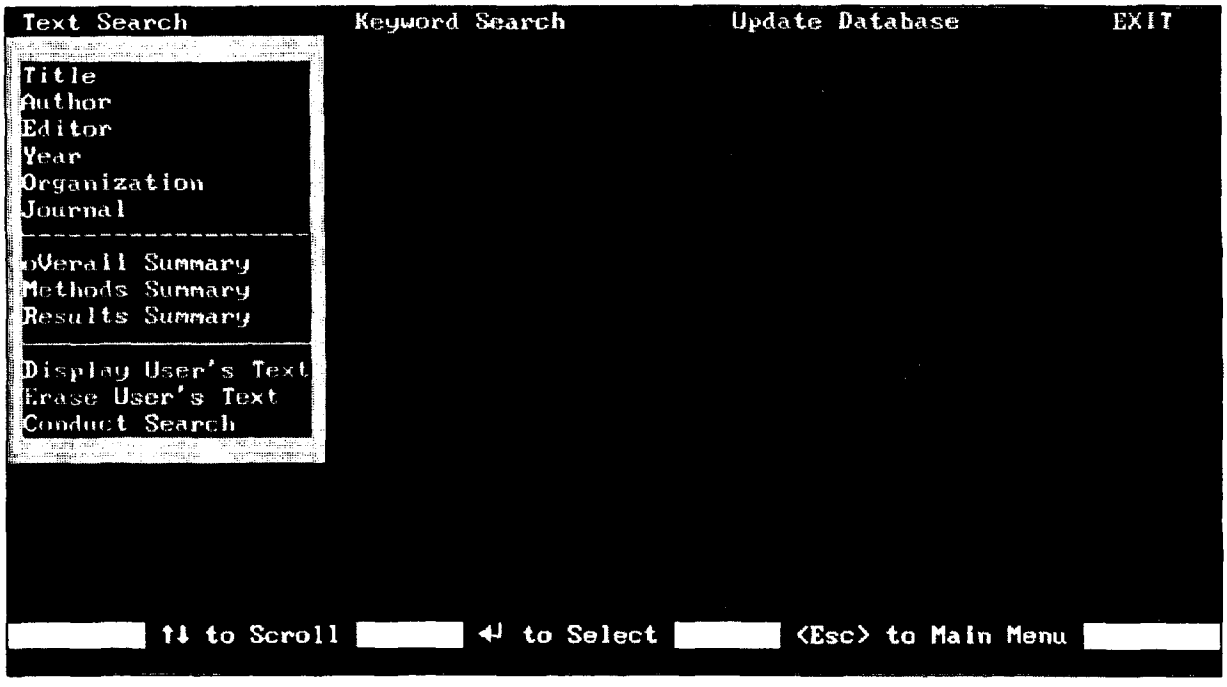

Figure 6. Searchable database fields during a Text Search.

For example, if the user is interested in searching for literature with the text "plantar" in the title, he/she simply highlights title from the list of text search options using ↑ ↓ and presses [↵]. The search text can be entered in the title field, followed by a [↵]. In the example displayed in Figure 7, the search text within the title field is "plantar." Search text can be located anywhere within the search field of a qualifying title.

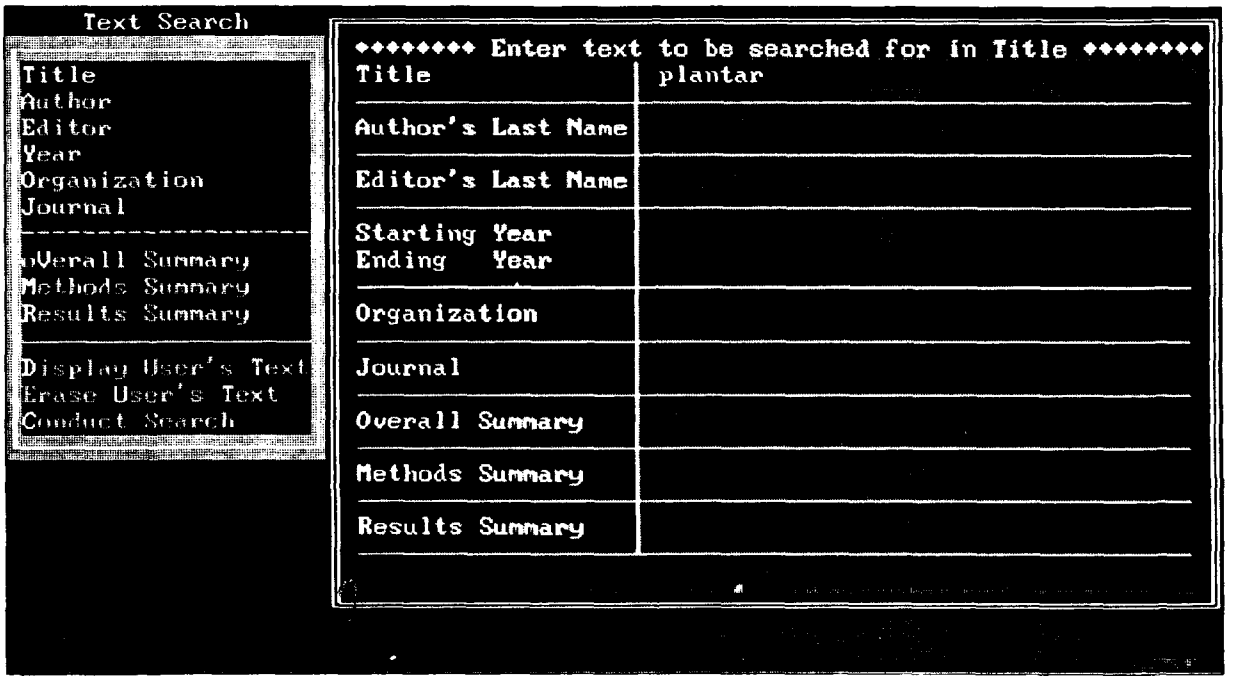

Figure 7. Entering title text.

From this point, it is possible to: 1) enter more text in another searchable database field; 2) display user's text; 3) erase user's text; or 4)conduct a search. Each of these options is described below.

4.3.1.1 Entering Additional Search Text. It is possible to build a search sequence that includes user specified text in one, a few, or all of the nine searchable database fields. For example, the user may wish to specify a particular time period. If multiple fields are included in the search sequence, each of the user-

specified text strings must be found if a literature entry is to qualify as a match. To add another item to the search sequence, the user highlights the desired field, enters additional search text and presses [↵]. Again, it is possible to enter as much or as little text as desired. Generally, the more text specified, the fewer pieces of literature will be found. Conversely, specifying shorter strings will result in more literature being found. The time it takes the system to complete a search increases with the amount of specified search text.

4.3.1.2 Displaying User's Text. The user may wish to check text specifications before conducting a search. An option under the "Text Search" menu entitled "Display User's Text" is available for such an action. This option allows the user to check for typographical errors or study a complicated search sequence. To display user's text, highlight the "Display User's Text" option using ↑ ↓ and press [↵]. A screen similar to the one presented in Figure 8 will be displayed.

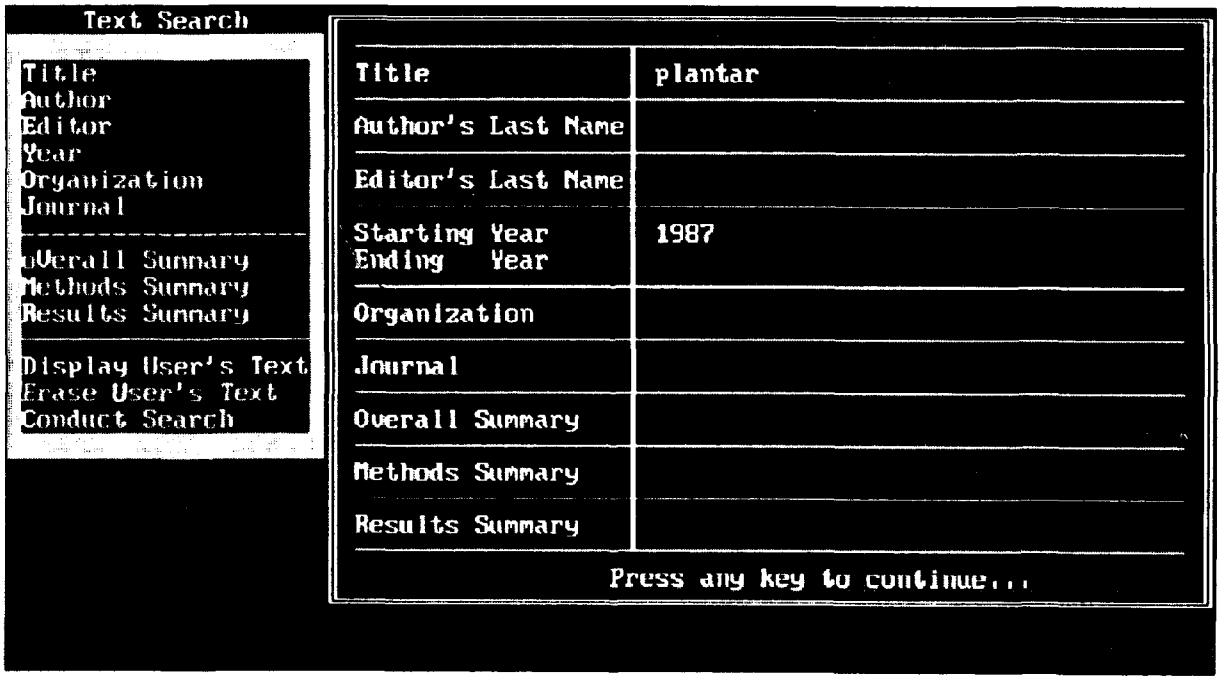

Figure 8. Displaying user's text.

4.3.1.3 Erasing User's Text. The user may wish to erase all text that has been specified in order to start another search with a "clean slate." To erase all user input, highlight the "Erase User's Text" option using ↑ ↓ and press [↵]. The user is asked to confirm or negate the request (see Figure 9). Confirming the request for erasure displays the screen shown in Figure 10. Negating the request for erasure returns the user to the list of text search options, leaving all previously specified text intact.

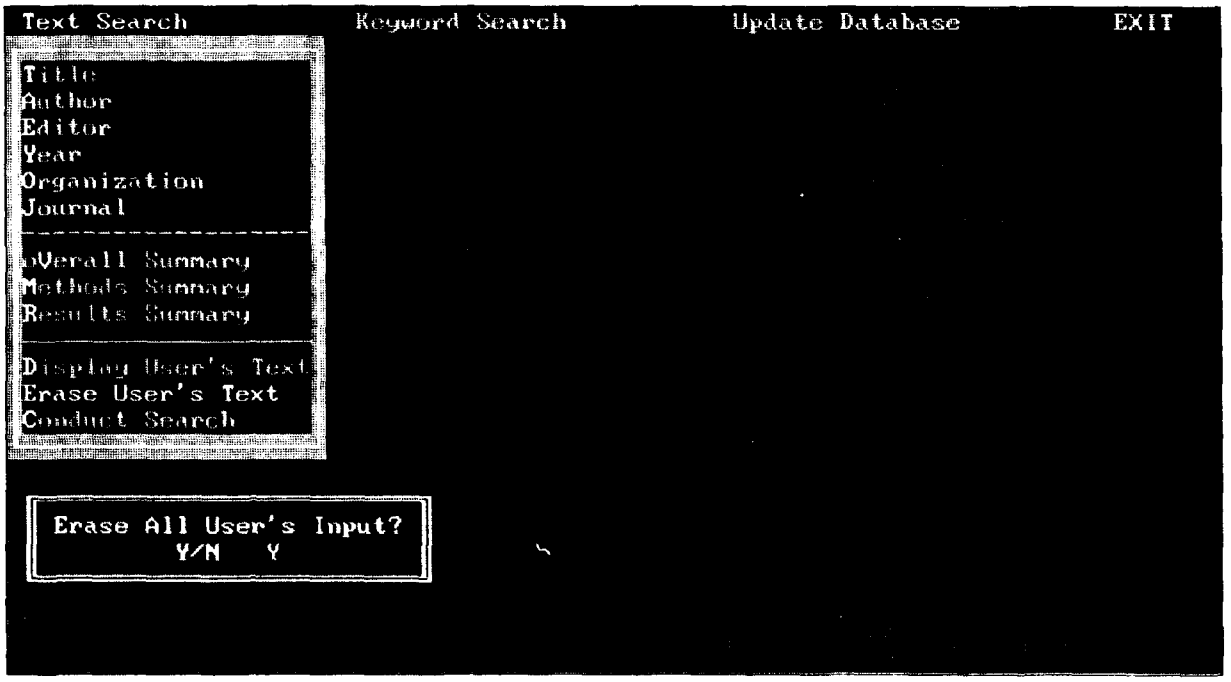

Figure 9. Confirming a request for erasure.

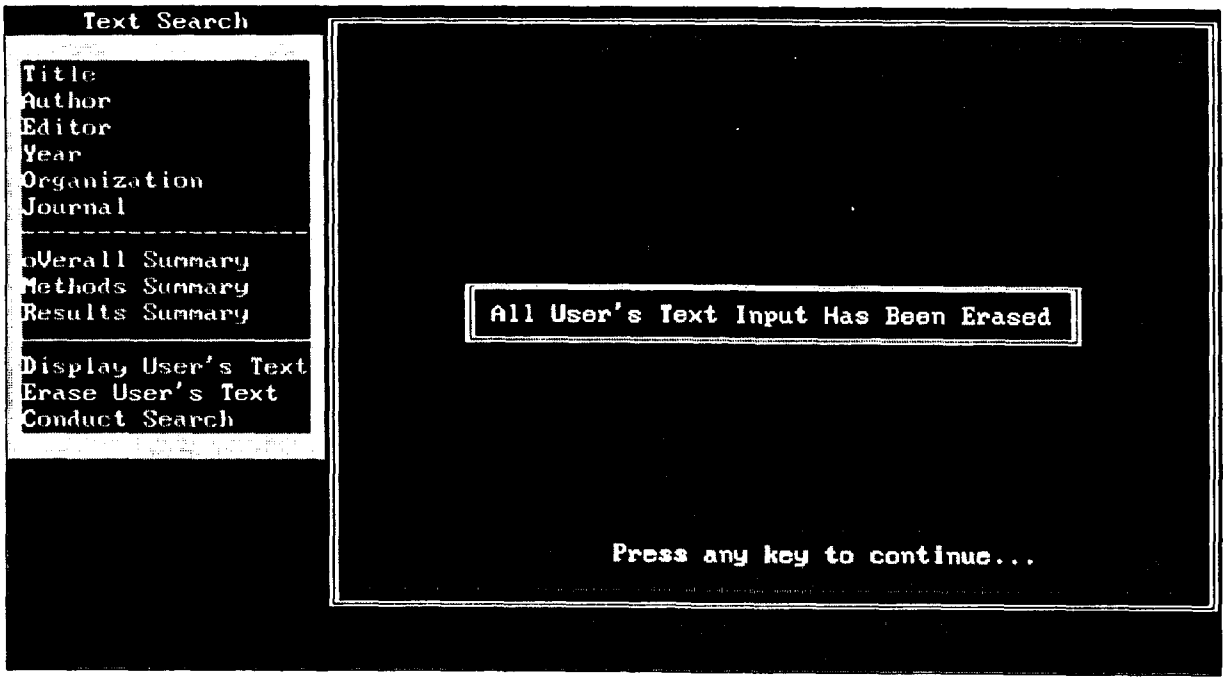

Figure 10. Erasing user's text input.

4.3.1.4 Conducting a Text Search. The user may conduct a text search after specifying search text. This is accomplished by choosing the "Conduct Search" option using ↑ ↓ and pressing ↵. The user is then asked to confirm or negate the request (see Figure 11).

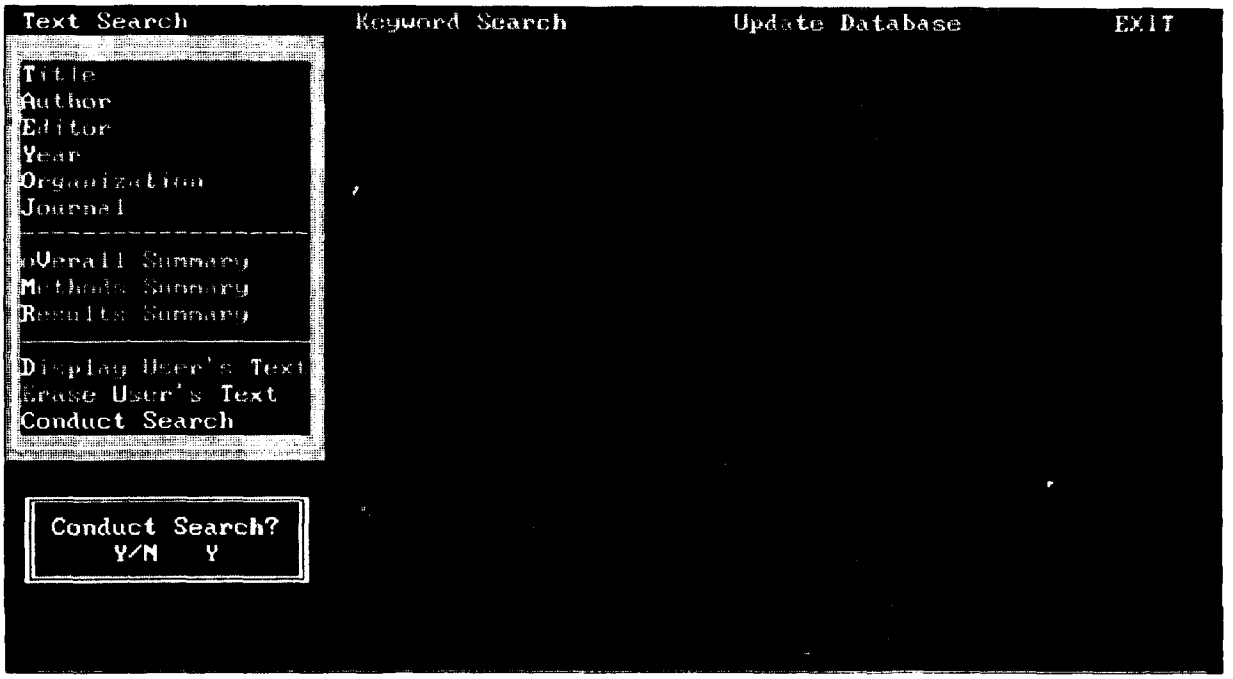

Figure 11. Confirming the start of a Text Search.

Negating the request for a search returns the user to the list of text search options, leaving all input intact. Upon confirming the request for a search, the system begins its search for literature that meets each of the text specifications. All literature in the database is evaluated to determine if it meets the specifications of the user's search text. Qualifying literature is written to a list of matches. The user may generate a list of all the titles contained in Natick's Footwear Database by leaving all search text entries blank. The user, however, is required to confirm or negate the request for this type of search (see Figure 12).

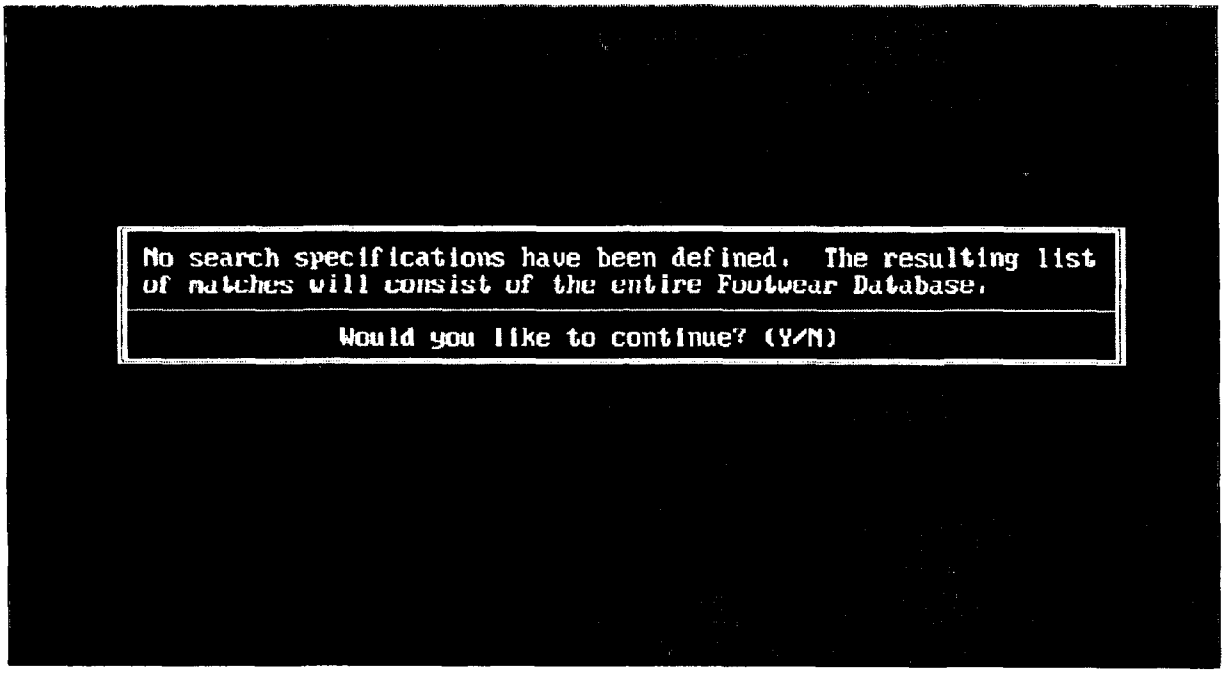

Figure 12. Confirming/negating the request for a search involving no user-specified text.

During a text search, the message, "Please wait while search is being conducted," is displayed. An unsuccessful search displays a message stating "No matches found" and then returns the user to the main menu, keeping previous input intact. A successful search displays a list of literature titles that meets the demands of the search specifications (see Figure 13). Titles of technical reports, journal articles, and chapters in edited books appear in the left-hand column; titles of books appear in the right-hand column. If a title is longer than 40 characters, only a portion of it is displayed because of screen limitations. It is possible to view the entire contents of each title by first highlighting the title and then using ← → , **<Home>**, or **<End>** to scroll the contents horizontally.

At this point, the user may want to view and/or print the results of the text search. The instructions for viewing and printing results from a text search are the same as those for viewing and printing results from a keyword search. Therefore, the

keyword search is described next and information on viewing and printing follows (see Section 4.3.3, Viewing and Printing Options).

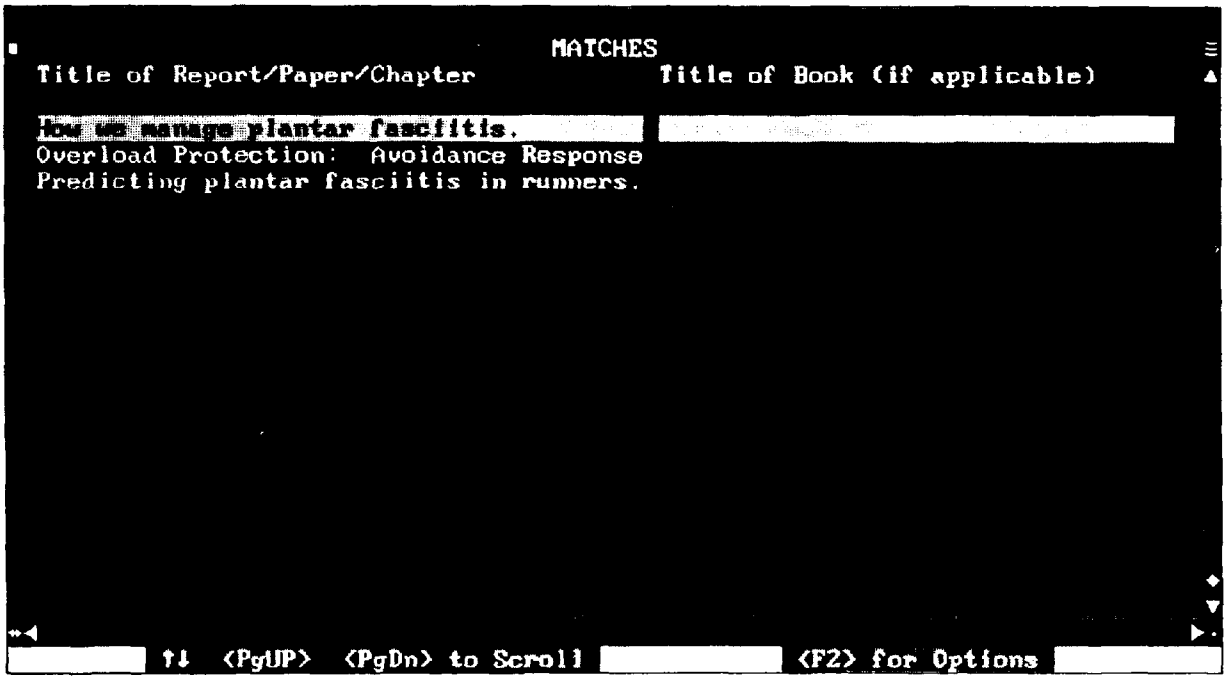

Figure 13. Results of a successful Text Search.

4.3.2 Keyword Search. The user is advised to become familiar with available keywords prior to conducting a keyword search. New keywords may be added by database maintenance personnel. Valid keywords at the time of publication of this report are presented in Appendix D. To conduct a keyword search, highlight "Keyword Search" on the main menu by using ← → and press [↵] (see Figure 14).

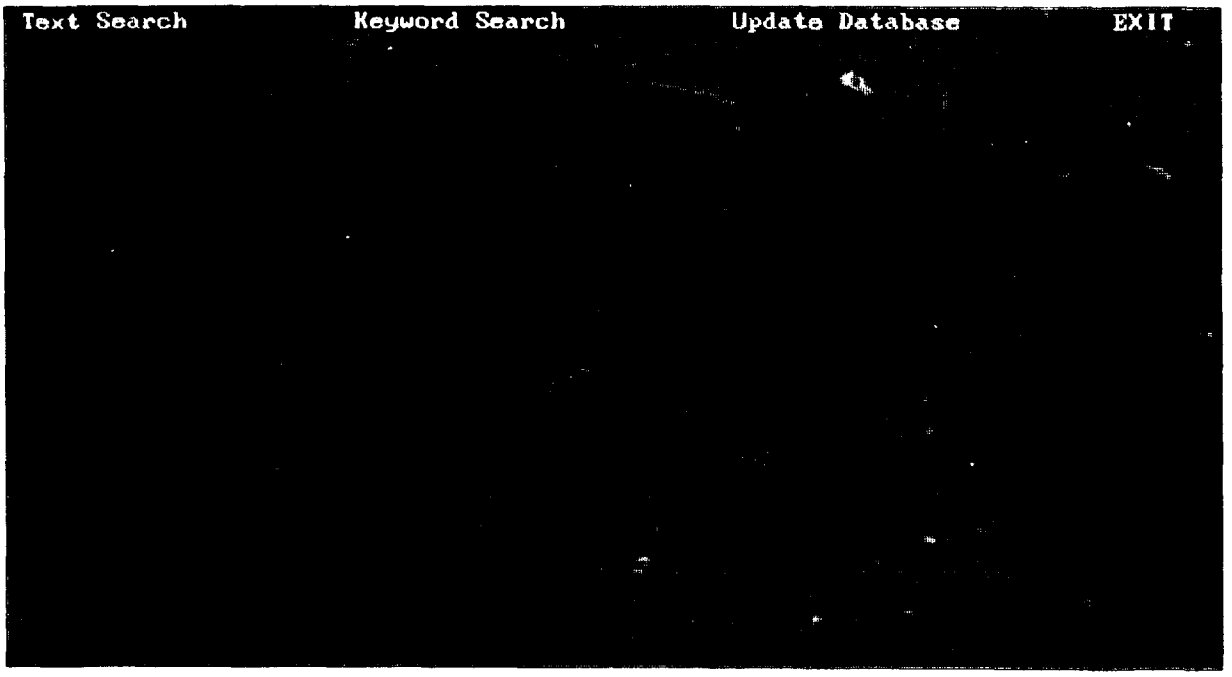

Figure 14. Main menu with "Keyword Search" highlighted.

The keyword search allows the user to identify literature to which one or more keywords has been assigned. Search keywords may be selected from one or more of the following major topics: Anatomy, Biomechanics, Environment, Footwear, Injury, Physiology, and Other (see Figure 15). It is possible to include up to six keywords per search. When more than one search keyword is chosen, the user must decide if the keywords are to be connected with a logical "and" or a logical "or." A logical "and" specifies that **each** qualifying piece of literature must have **all** the search keywords assigned to it. A logical "or" specifies that **each** qualifying piece of literature must have **at least one** of the search keywords assigned to it.

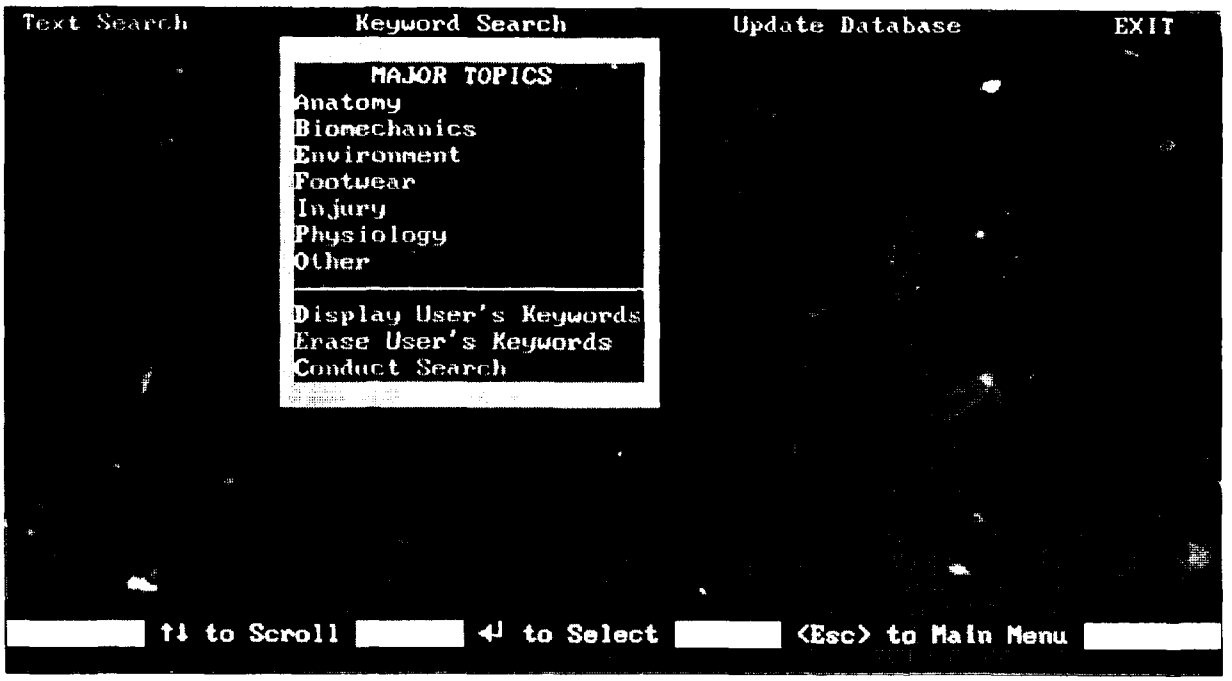

Figure 15. Major topics to choose from during a Keyword Search.

For example, to search for literature that has the keyword "hot weather combat boot" assigned to it, the user highlights "Footwear" from the list of major topics using ↑ ↓ and presses ↵ (see Figure 16). Next, the user locates "hot weather combat boot" in the list of keywords using ↑ ↓ and presses ↵. The keyword "hot weather combat boot" is displayed in a window titled: "User's Keyword List" (see Figure 17). After pressing any key to remove the list from the screen, the user may select another keyword from the Footwear list or press **<F10>** to exit the keyword list.

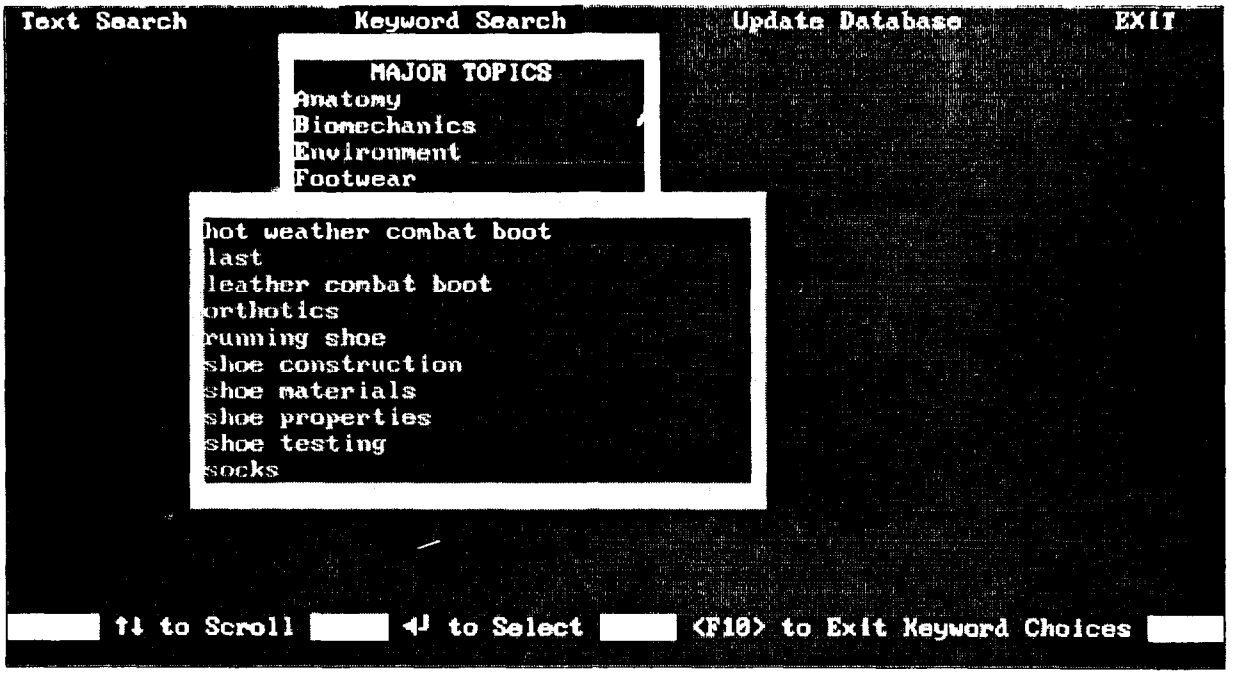

Figure 16. Keywords available under the major topic of Footwear.

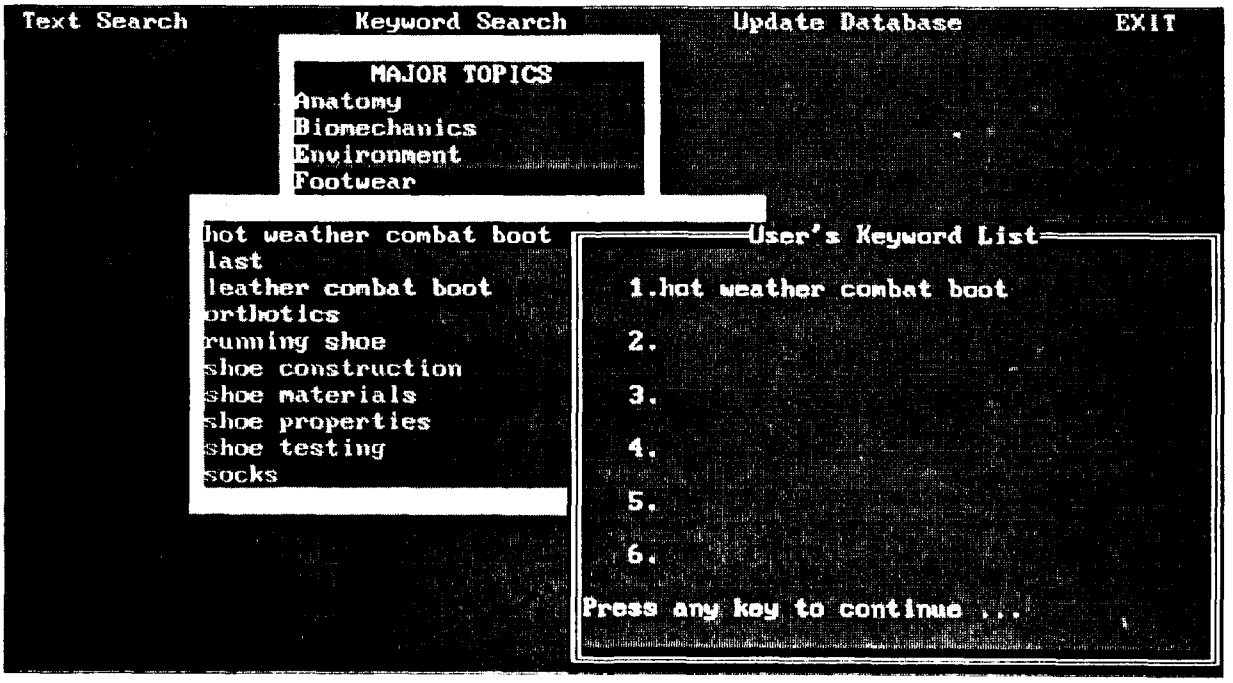

Figure 17. User's Keyword List.

From this point, it is possible to: 1) select more keywords; 2) display user's keywords; 3) erase user's keywords; or 4) conduct a search. Each of these options is described below.

4.3.2.1 Selecting Additional Keywords. The user may build a search sequence that includes up to six keywords. All search keywords do not have to be chosen from the same major topic. To add another keyword to the search sequence, simply highlight the desired major topic, select the additional search keyword(s), and press [↵]. In the example presented in Figures 18 and 19, the keyword "lower extremity disorders" is chosen from the major topic of Injury. Each keyword added to a search sequence increases the system search time.

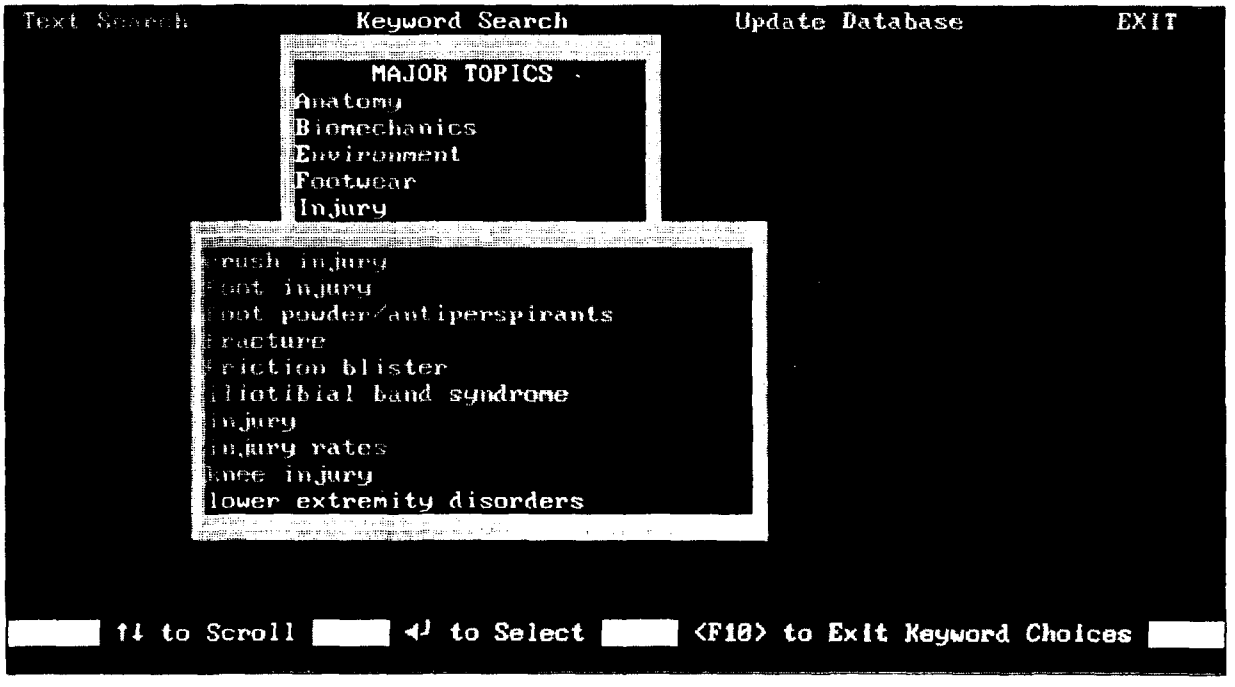

Figure 18. Keywords available under the major topic of Injury.

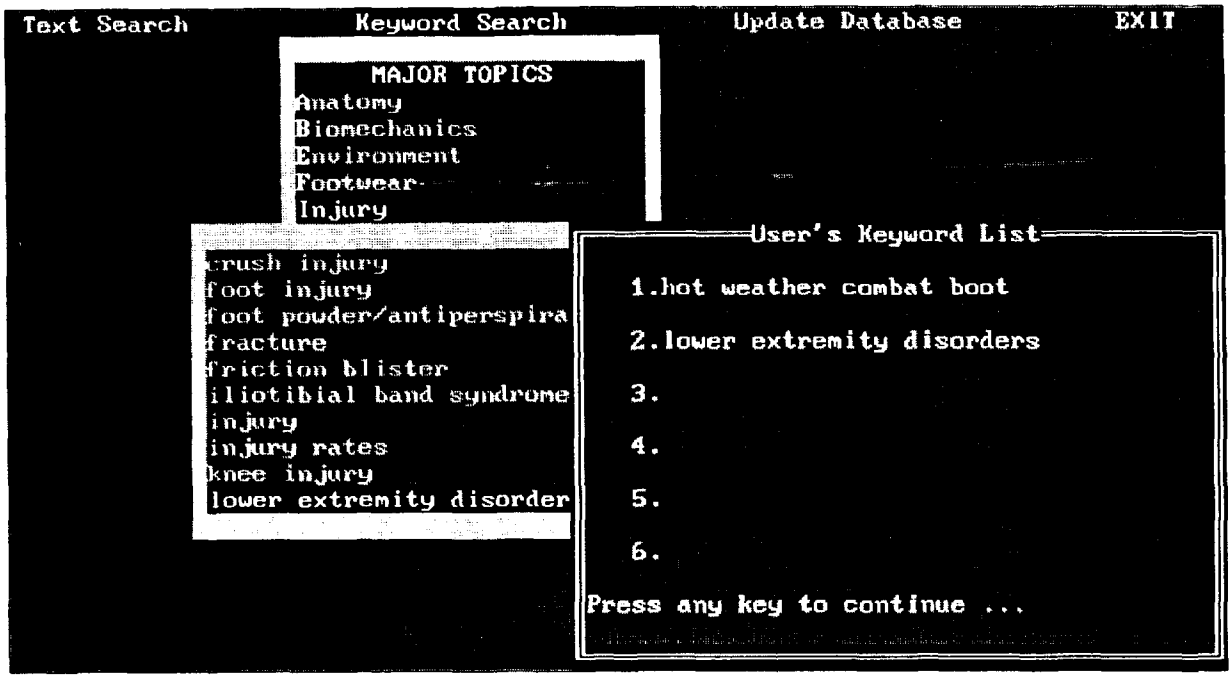

Figure 19. User's Keyword List.

4.3.2.2 Displaying User's Keywords. The user may wish to check specified keywords before conducting a search. An option under the "Keyword Search" menu entitled "Display User's Keywords" is available for such an action. This option allows the user to examine the list before choosing a logical "and" or a logical "or" type of keyword search. To display user's keywords, highlight the "Display User's Keywords" option using ↑ ↓ and press ↵. A screen similar to the one presented in Figure 20 is displayed.

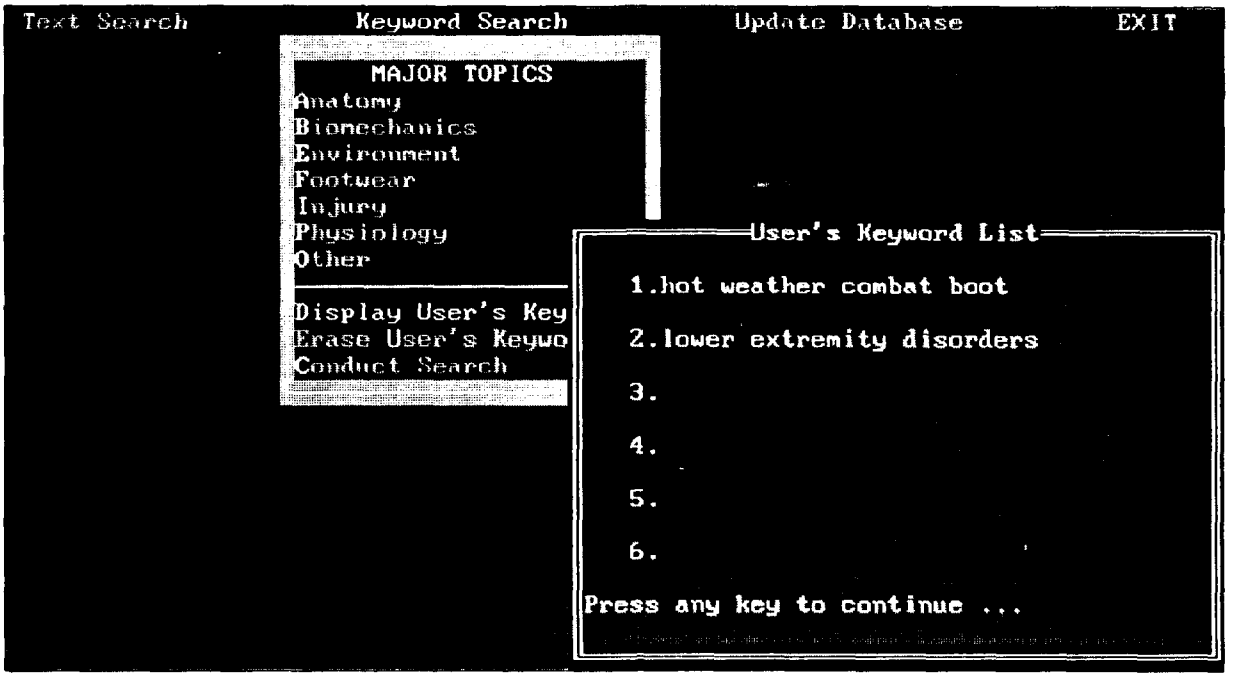

Figure 20. Displaying a User's Keyword List.

4.3.2.3 Erasing User's Keywords. The user may wish to erase all keywords that have been specified in order to start another search with a "clean slate." To erase all user input, highlight the "Erase User's Keywords" option using ↑ ↓ and press ↵. The user is asked to confirm or negate the request (see Figure 21). Confirming the request for erasure displays the screen shown in Figure 22. Negating the request for erasure returns the user to the list of keyword search options, leaving all previously specified keywords intact.

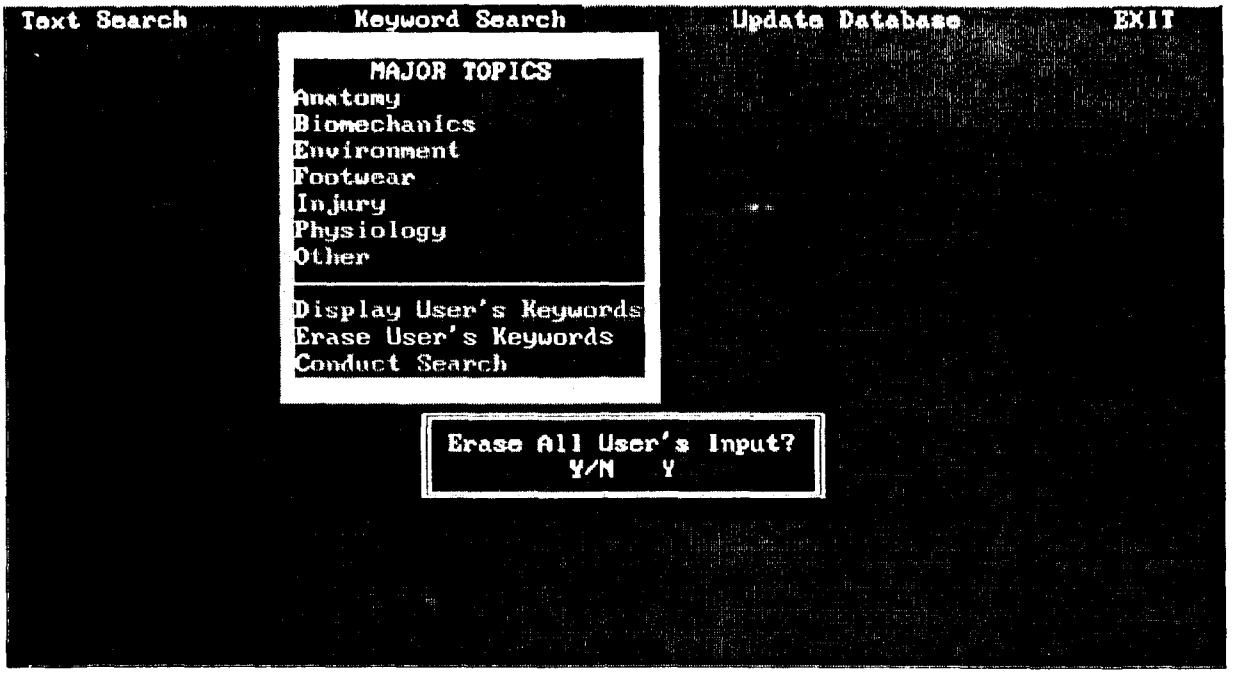

Figure 21. Confirming a request for erasure.

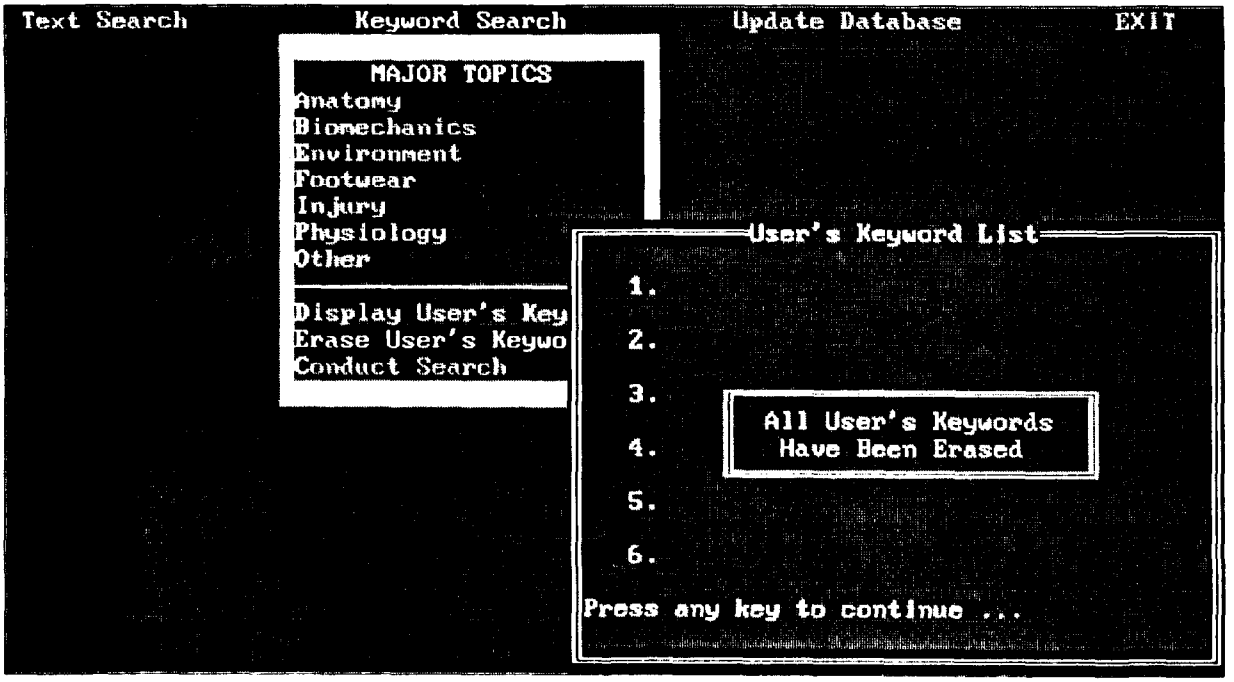

Figure 22. Erasing user's keywords.

4.3.2.4 Conducting a Keyword Search. The user may conduct a keyword search after specifying search keywords. This is accomplished by choosing the "Conduct Search" option using ↑ ↓ and pressing [↵]. The user is asked the type of keyword search to be performed. The user enters **A** to connect keywords with a logical "and" or **O** to connect keywords with a logical "or", and presses [↵]. When only one search keyword is specified, either connection will yield the same results. The following example involves a logical "and" keyword search (see Figure 23). The user is then asked to confirm or negate the request (see Figure 24).

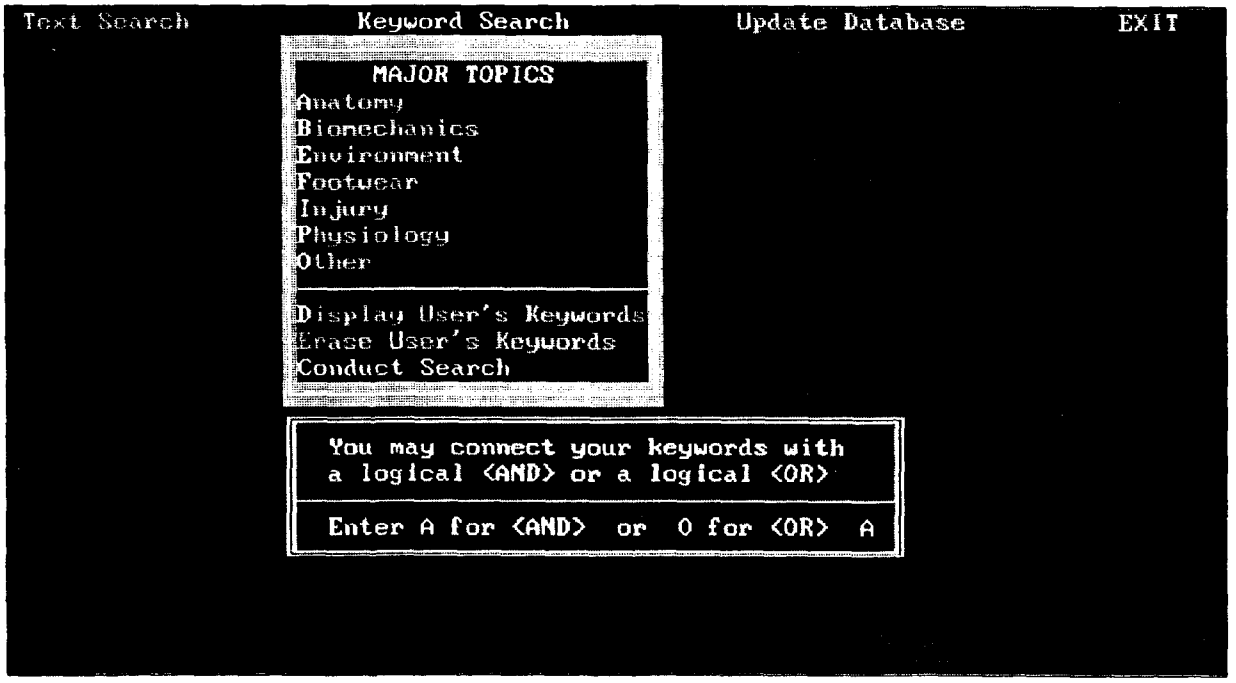

Figure 23. Selecting a type of Keyword Search.

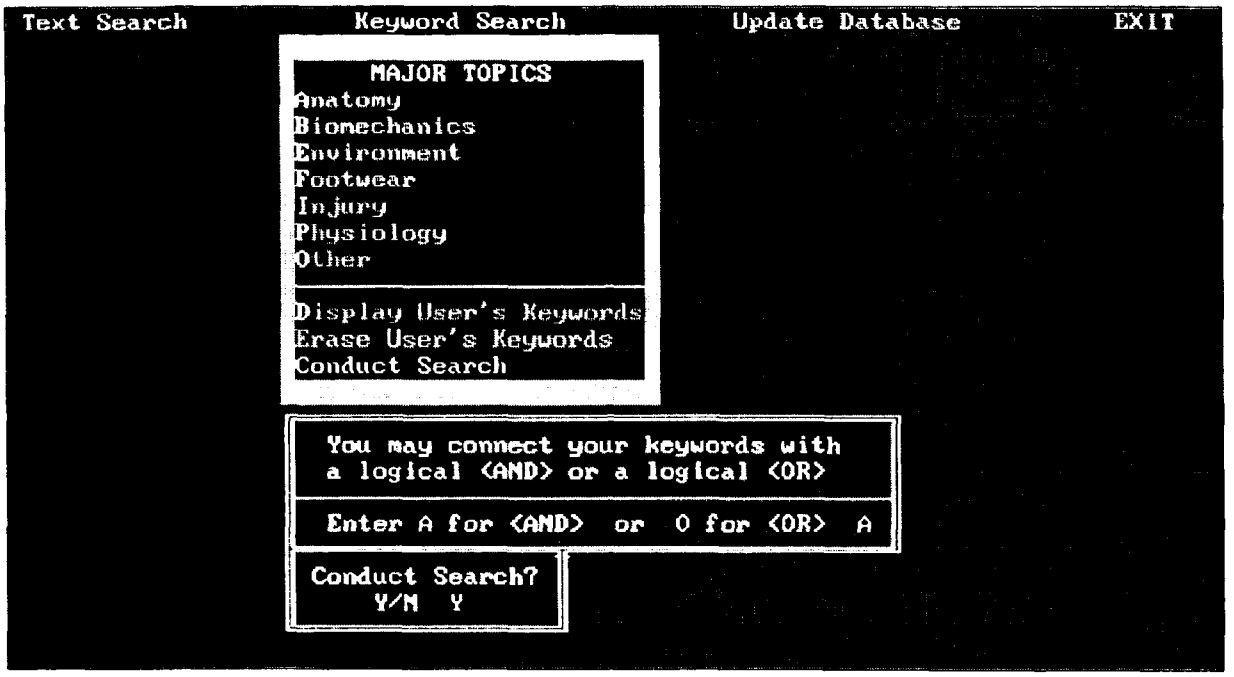

Figure 24. Confirming the start of a Keyword Search.

Negating the request for a search returns the user to the list of keyword search options, leaving all input intact. Upon confirming the request for a search, the system begins its search for literature that meets the keyword search specifications. All literature in the database is evaluated to determine if it meets the specifications of the user's search keywords. Qualifying literature is written to a list of matches. The user may generate a list of all the titles contained in Natick's Footwear Database by leaving all search keyword entries blank. The user, however, is required to confirm or negate the request for this type of search (see Figure 25).

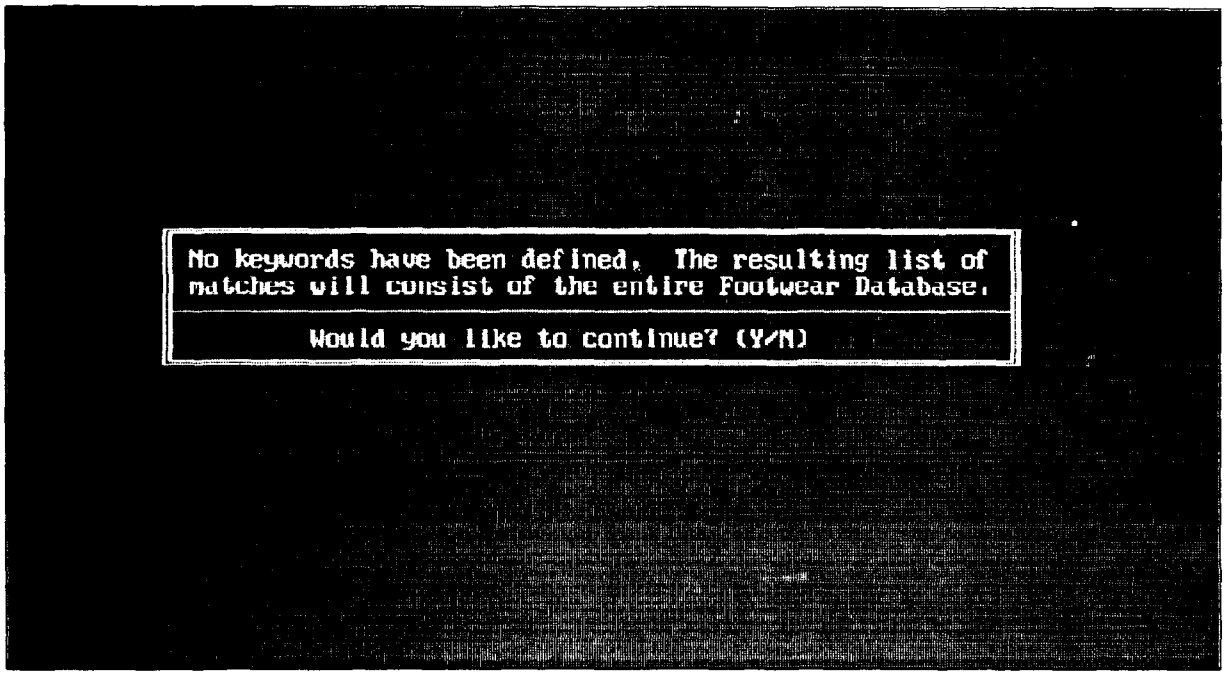

Figure 25. Confirming/negating the request for a search involving no user-specified keywords.

During a keyword search, the message, "Please wait while search is being conducted," is displayed. An unsuccessful search displays a message stating "No matches found" and then returns the user to the main menu, keeping previous input intact. This allows the user to make note of unsuccessful combinations of keywords and, if desired, try another search. A successful search displays a list of literature titles that meets the demands of the logical "and" keyword search specifications (see Figure 26). For comparison, Figure 27 displays the results of a logical "or" keyword search involving the same two keywords: "hot weather combat boot" and "lower extremity disorders." Report, paper, and chapter titles appear in the left-hand column and book titles appear in the right-hand column. If a title is longer than 40 characters, only a portion of it is displayed because of screen limitations. It is possible to view the entire contents of each title by first highlighting it and then using ← → , **<Home>**, or **<End>** to scroll the contents horizontally. For viewing and

printing instructions, please consult Section 4.3.3 of this report.

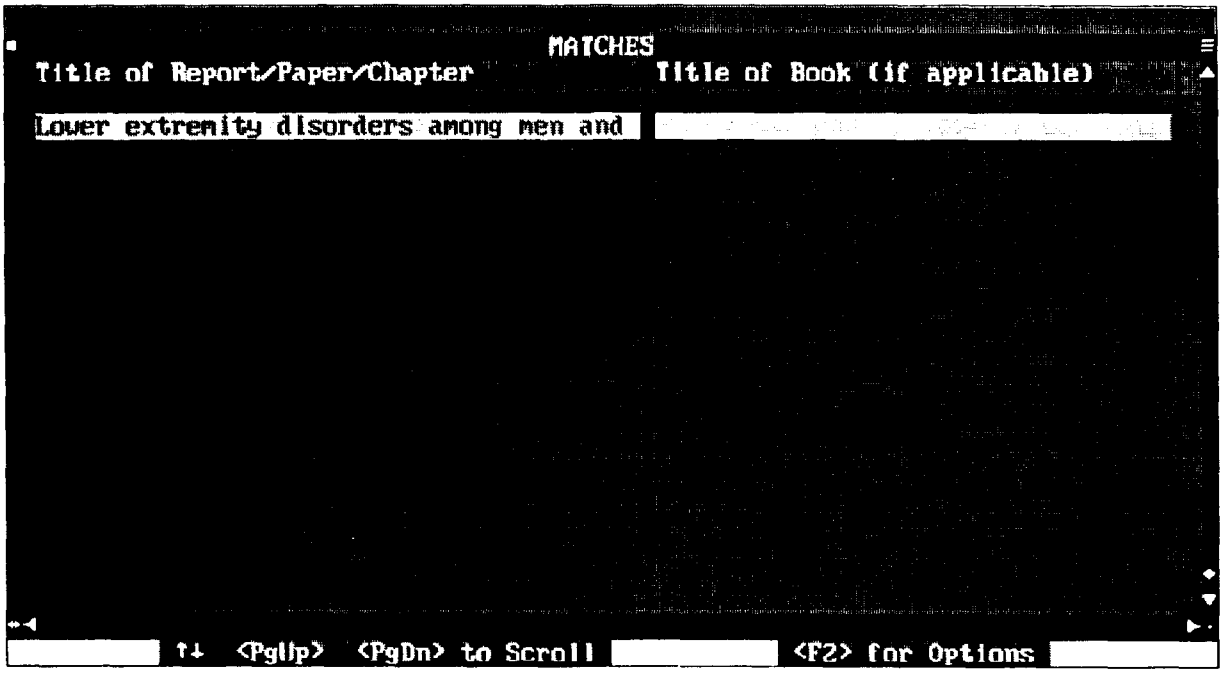

Figure 26. Results of a successful logical "and" Keyword Search.

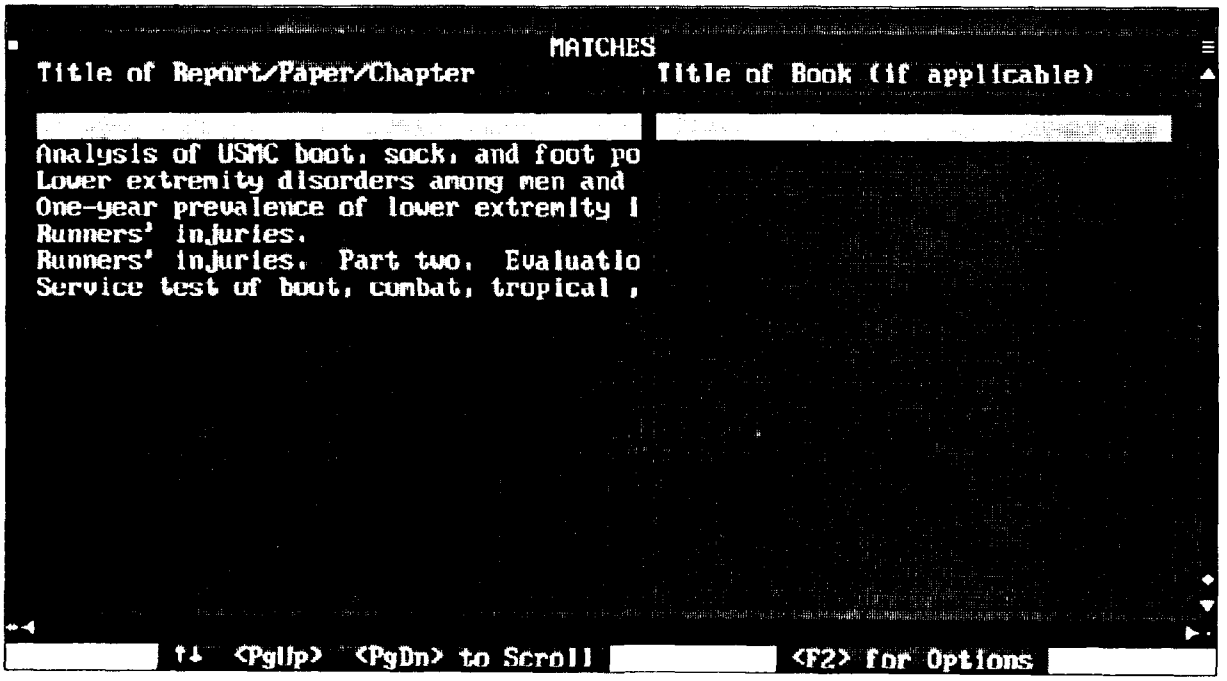

Figure 27. Results of a successful logical "or" Keyword Search.

4.3.3 Viewing and Printing Options. As discussed earlier, the instructions in this section can be used for viewing and printing literature found as the result of either a text search or a keyword search. For purpose of demonstration, the search conducted in Section 4.3.1, Text Search, is continued in this section. At the bottom of the screen displaying the list of matches, there are on-screen instructions. Pressing ↑ ↓, **<PgUp>**, and **<PgDn>** allows the user to scroll the list of matches and highlight a title of interest. Pressing **<F2>** presents the user with a View/Print menu (see Figure 28).

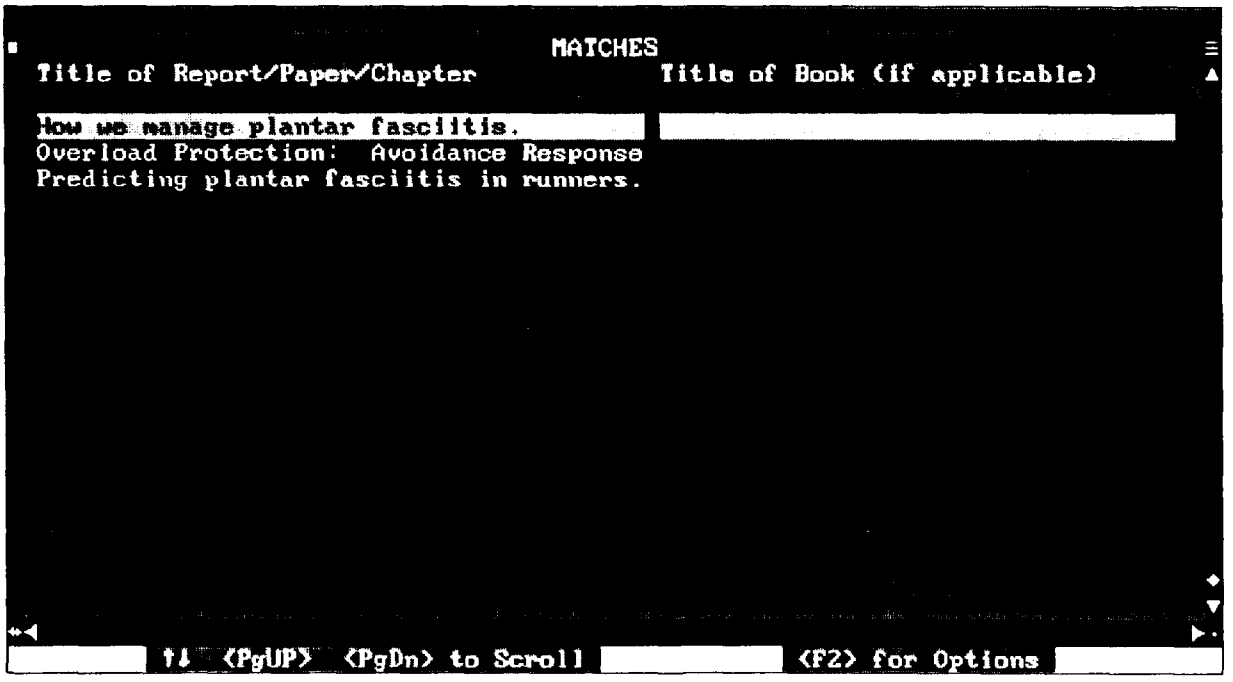

Figure 28. A list of matches with on-screen instructions.

Before pressing **<F2>**, attention should be paid as to which literature title is currently highlighted. After pressing **<F2>**, the View/Print menu is displayed. This menu allows viewing of information stored for the currently highlighted title, returning to the list of matches, generating printed output, or quitting the search (see Figure 29). Before describing these menu options, the

information stored in the database for a piece of literature will be explained and illustrated.

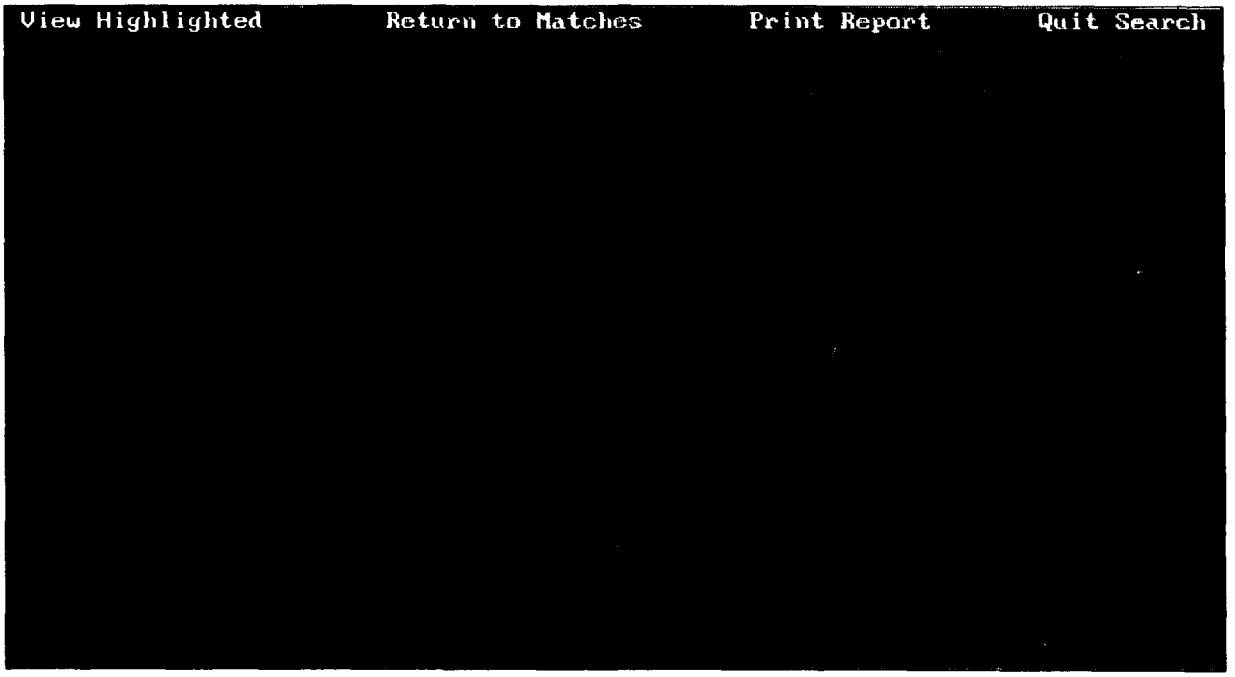

Figure 29. View/Print menu.

4.3.3.1 Contents of a Database Entry. Whether a record is viewed on-screen or as printed output, the contents are the same. For purposes of explanation, the presentation that would be viewed on the screen is described and illustrated here. For each literature title, there are three screens of reference information. Additional screens of textual information may be accessed at the user's option. Fields of information that do not apply to a record are left blank. The contents of each of the three screens of reference information are as follows:

a. First Screen (see Figure 30) -- This contains the title and author(s) of the piece of literature and, when applicable, the editor(s).

b. Second Screen (see Figure 31) -- This contains additional reference information. For journal articles, the name of the journal, year of publication, volume number, and relevant page numbers are presented. In the case of technical reports, the name and location of the organization releasing the report and the date of publication are presented along with any internal control number assigned by the organization and the DTIC accession code. For books, the year of publication and name and location of the publisher are presented.

c. Third Screen (see Figure 32) -- This lists the keywords assigned to the entry and allows the user to access the memo fields containing the textual information.

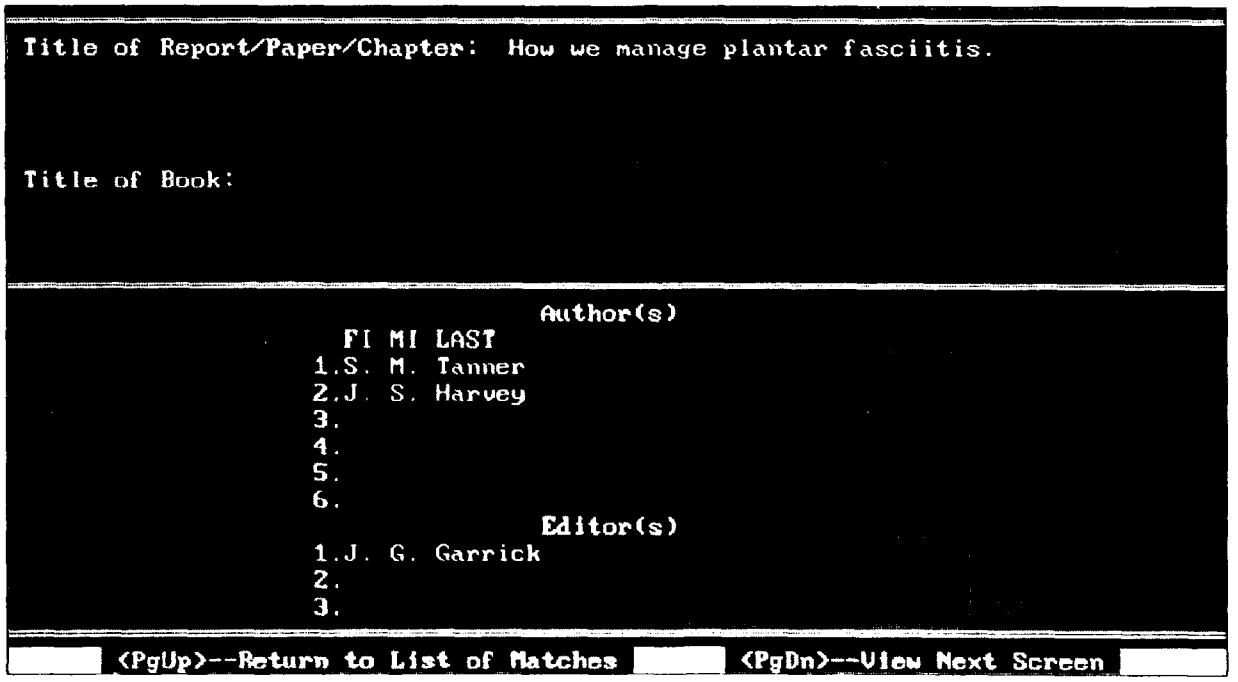

Figure 30. First screen of record information.

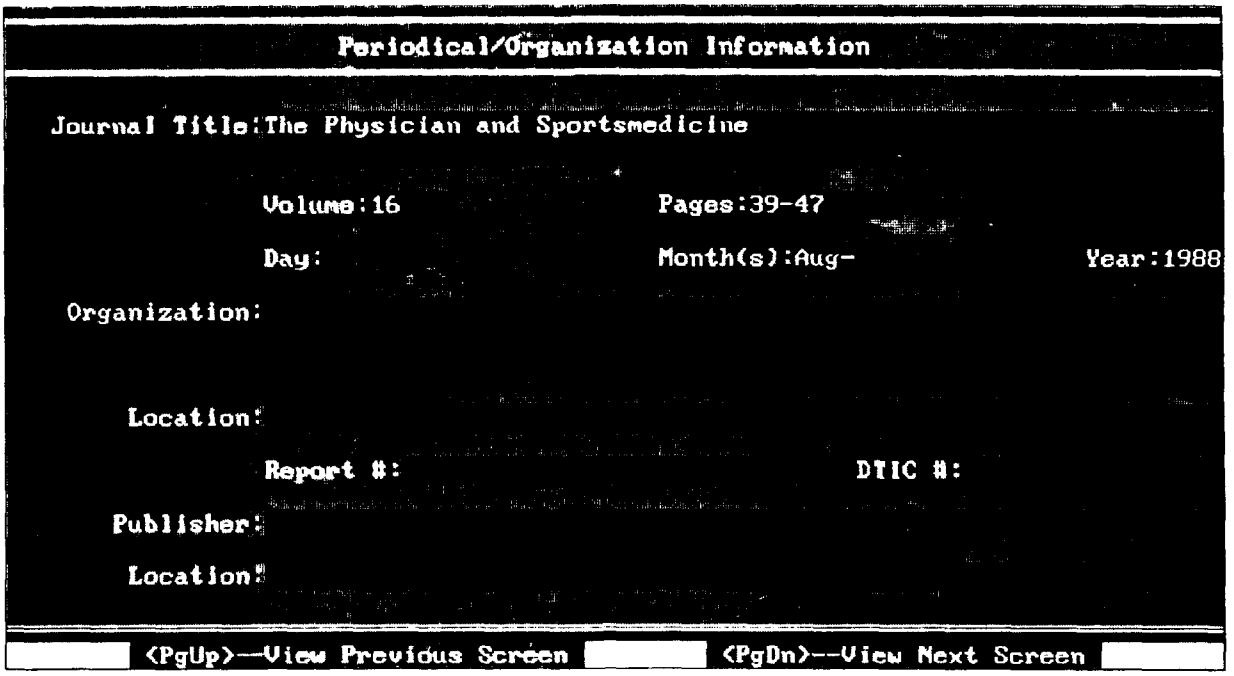

Figure 31. Second screen of record information.

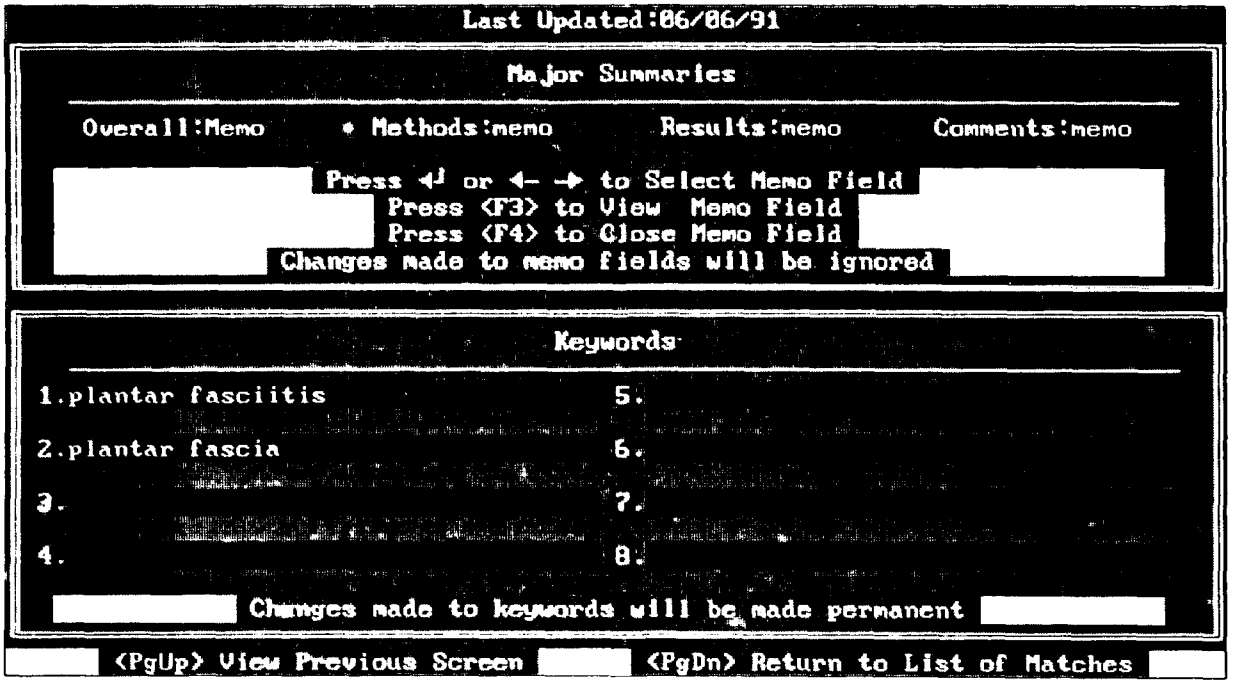

Figure 32. Third screen of record information.

The textual information, which is contained in four memo fields, represents summaries of various portions of the literature being treated. One of the fields, the Overall Summary, always has information; the other memo fields may or may not contain information, depending upon the nature of the particular literature. A description of each of the memo fields is as follows:

Overall -- The Overall Summary presents the most important points of the literature. The extent to which details are included in the summary depends on the nature of the literature. For example, the overall summary of an authored book is very general, whereas the overall summary of a review article is likely to contain specific information.

Methods -- The Methods Summary provides a synopsis of the methodology of a report on a single experiment. This summary contains information about the subjects, equipment, procedures, and dependent and independent variables used in the experiment.

Results -- The Results Summary presents the key findings of a research work. This summary is not as detailed as the results section of the actual report, but it is usually more extensive than the published abstract.

Comments -- The Comments field contains observations of the reviewer for Natick's Footwear Database. These comments may provide the user with additional information (e.g., the paper is a roundtable discussion or an abstract presented at a specific conference) or may alert the user to shortcomings in experimental design.

Usually, in the summaries included in Natick's Footwear Database, wording such as: "the authors cite others on..." alerts the user to thoughts that are not the author's own. However, the

author of a paper may cite numerous references to the work of others, and it would be cumbersome to include the above wording in every instance. The user is advised to consult the actual publication in order to determine the origin of specific ideas and information.

4.3.3.2 Viewing Highlighted. In order to view the title that is currently highlighted in the list of matches, select the "View Highlighted" option from the View/Print menu using ← → and press [↵]. This allows the user to view all of the information stored in the database for the highlighted title. The development version also allows maintenance personnel to change or add keywords to individual records while using the view highlighted option. New keyword assignments may be taken from the existing keywords list found in Appendix D or they may be entirely new to the system. Any keyword modifications will be made permanent to the record at the end of a text or keyword search. In addition, entirely new keywords will be identified which the user may add to existing keywords lists for major topics (see Section 4.3.3.6, Adding New Keywords). It is not possible, however, to modify or add information to any of the other database fields using the "View Highlighted" option. The contents of the memo fields appear to be modifiable, but these changes are ignored at the end of a text or keyword search. Permanent modifications to textual summaries can be made by using the "Update Database" option described in Section 4.3.4, Updating the Database.

In addition to fields of information for the highlighted title, there are also on-screen instructions denoting functions of pertinent keystrokes. See Table 4 for an outline of valid keystrokes for each of the three screens.

Table 4. On-Screen Instructions While Viewing.

Screen #1	**<PgUp>**	returns user to list of matches
	<PgDn>	takes user to second screen of information
Screen #2	**<PgUp>**	returns user to first screen of information
	<PgDn>	takes user to third screen of information
Screen #3	**<PgUp>**	returns user to second screen of information
	<PgDn>	returns user to list of matches
	↵, ← →	positions cursor in desired memo field
	<F3>	opens current memo field for viewing
	<F4>	closes current memo field

To view textual information stored for any of the four memo fields, place the cursor in the desired memo field using ↵ or ← → and press **<F3>** (see Figure 33). If a memo field contains textual information, the letter "M" in the word "Memo" will be capitalized. If a major summary memo field does not contain textual information, the letter "m" in the word "memo" will not be capitalized. Notice in the example in Figure 33 that there is textual information only in the Overall Summary.

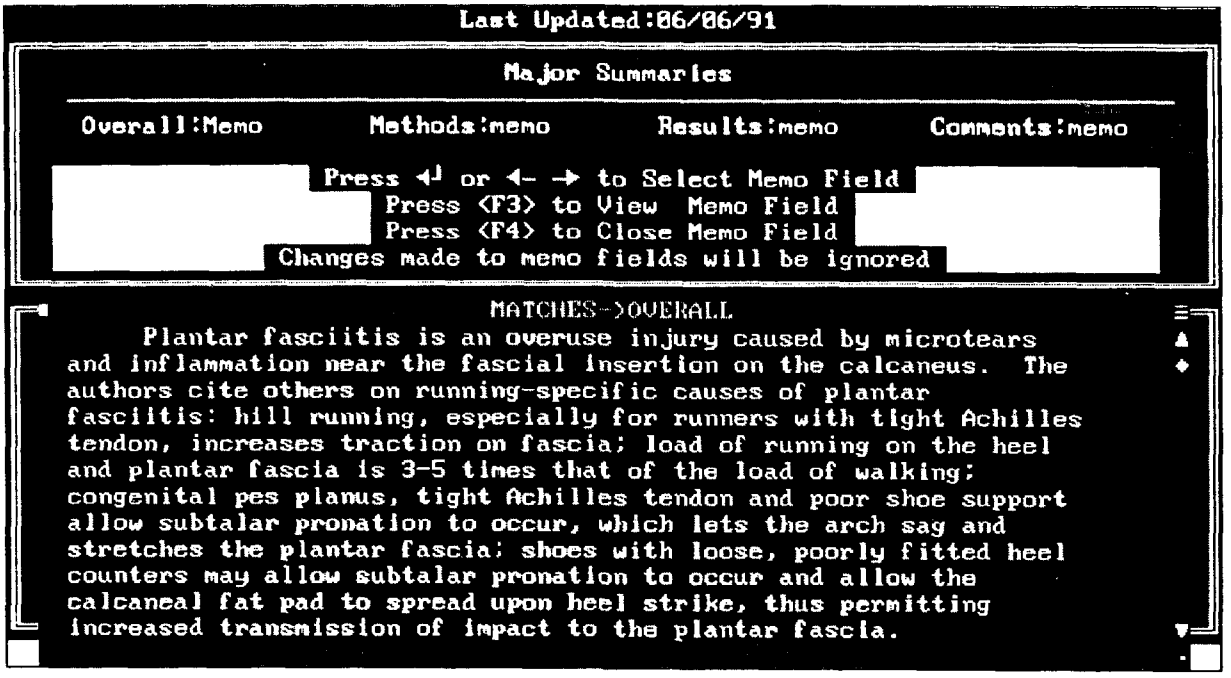

Figure 33. Textual summary presented in an opened memo field.

Once a memo field, or text window, has been opened with **<F3>**, it can be scrolled using ↑ ↓, **<PgUp>**, and **<PgDn>**. As mentioned earlier, memo text may be changed while viewing, but modifications will be ignored at the end of the search. To close a memo field, press **<F4>**. After viewing a record, the system returns to the list of matches with the next title highlighted. From here, press **<F2>** for options, or highlight a different title and then press **<F2>** for options. Again, options allow viewing information on the screen, returning to list of matches, generating printed output, or quitting the search (see Figure 29).

4.3.3.3 Returning to List of Matches. The user may return to the list of matches by highlighting the "Return to Matches" option from the View/Print menu using ← → and pressing [↵]. If desired, the user may change the position of the highlight bar to a different title of interest.

4.3.3.4 Printing a Report. To print a report, select "Print Report" from the View/Print menu using ← → and press [↵]. Then, the user may choose either the "Currently Highlighted" or the "Entire List of Matches" option using ↑ ↓ and press [↵]. The "Currently Highlighted" option outputs information stored for any one selected title. The "Entire List of Matches" option outputs information stored for all titles in the list of matches. The demonstration report involves a single record using the "Currently Highlighted" option (see Figure 34).

Figure 34. Choosing currently highlighted record.

After selection of the report option, a message appears asking the user to confirm or negate the print request. Pressing **Y** continues with the print request, or **N** cancels the print request and returns the user to the View/Print menu (see Figure 35).

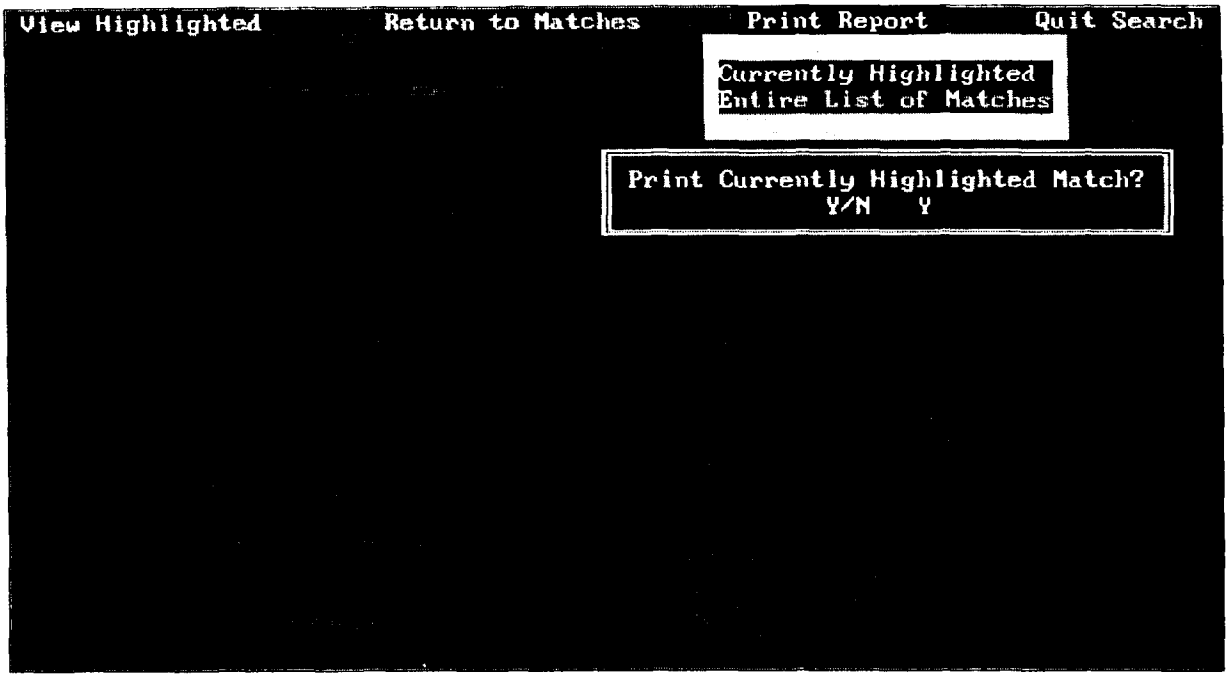

Figure 35. Continuing with a print request.

Upon continuing with the print request, the user chooses to print either a reference report or a detailed report. A reference report includes information stored in the database that is required for referencing an article or a book. A detailed report includes the contents of a reference report, as well as assigned keywords and textual summaries. The demonstration report involves a detailed report (see Figure 36).

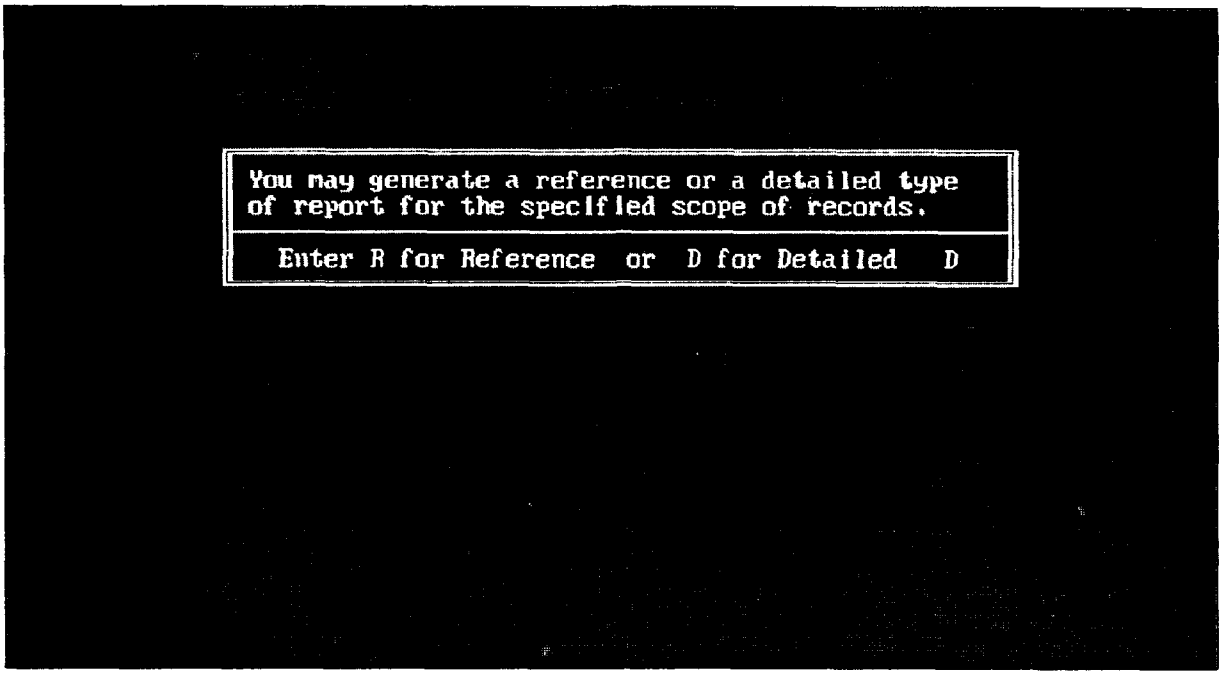

Figure 36. Choosing a detailed type of report.

Upon selection of the type of report, a list of printer choices appears. There are two types of printers from which to choose, in addition to an option to cancel the print request. The printer choices are either a dot matrix printer or a Hewlett Packard laser printer (see Figure 37). The output of the two types of printers differs only in graphical presentation and not in content. The cancel option returns the user to the View/Print menu. Selecting a type of printer automatically begins the print job. The message, "Please wait while the report is being printed..." is displayed on the screen until printing has been completed.

A print job that is in process may be canceled as follows. First, take the printer off line; usually this is accomplished by pressing the printer's on line button (check printer manual if this does not work). Second, wait for the system to generate a "Printer not ready. Retry?" message. Respond to this message by highlighting "No" and press [◄┘]. After a short pause, the above message appears again; respond by highlighting "No" and press [◄┘].

Next, the system returns to the View/Print menu. After canceling a print job, several pages may still print, depending on the size of the printer's memory. Once the printer has stopped, the printer's buffer must be cleared and the printer must be set on line. In most cases, clearing the buffer can be done be pressing the form feed button on the printer. After the printer stops printing, set it back on line by pressing the on line button. If the printer does not have a form feed button, consult the printer's manual for buffer clearing instructions.

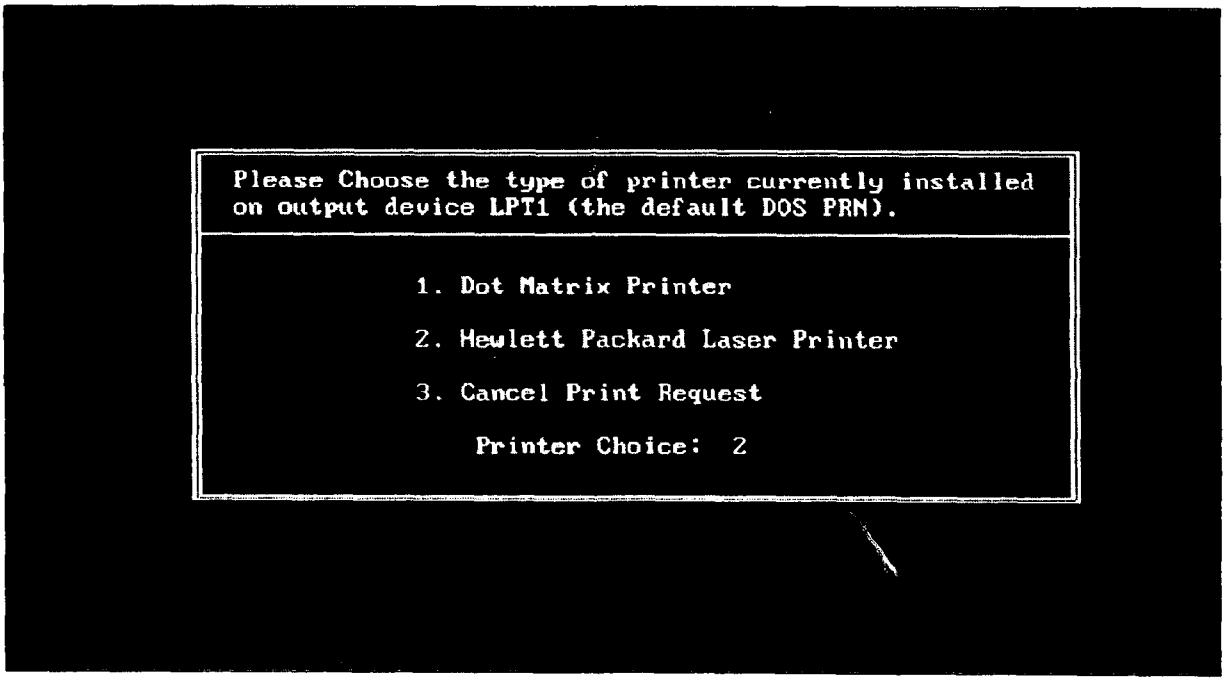

Figure 37. Printer options.

The detailed report for the currently highlighted title displayed in Figures 38a-c was generated using a Hewlett Packard LaserJet III laser printer.

Detailed Report
May 10, 1991

The following literature was located in Natick's Footwear Database as a result of the following text search specifications:

Title: plantar

Author's Last Name:

Editor's Last Name:

Starting Year: 1987
Ending Year:

Organization:

Journal:

Overall Summary: running

Methods Summary:

Results Summary:

Title of Report/Paper/Chapter: How we manage plantar fasciitis.

Title of Book: N/A

Author(s): S.M. Tanner
J.S. Harvey

Editor(s): J.G. Garrick

Journal: The Physician and Sportsmedicine

Volume: 16 Pages: 39-47

Day: N/A Month(s): Aug Year: 1988

Organization: N/A
Location: N/A

Report #: N/A DTIC #: N/A

Page 1

Figure 38a. First page of a sample report.

Publisher: N/A
Location: N/A

KEYWORDS

1. plantar fasciitis
2. plantar fascia

MAJOR SUMMARIES

OVERALL:

Plantar fasciitis is an overuse injury caused by microtears and inflammation near the fascial insertion on the calcaneus. The authors cite others on running-specific causes of plantar fasciitis: hill running, especially for runners with tight Achilles tendon, increases traction on fascia; load of running on the heel and plantar fascia is 3-5 times that of the load of walking; congenital pes planus, tight Achilles tendon and poor shoe support allow subtalar pronation to occur, which lets the arch sag and stretches the plantar fascia; shoes with loose, poorly fitted heel counters may allow subtalar pronation to occur and allow the calcaneal fat pad to spread upon heel strike, thus permitting increased transmission of impact to the plantar fascia.

Symptoms of plantar fasciitis include heel or arch pain which increases with jumping and running. Tenderness may exist along the entire medial plantar aspect of the foot. Passive dorsiflexion of the great toe stretches the fascia, increasing pain and making the medial fascial edge easily palpable. Flexion and extension of the great toe are often decreased in runners suffering from plantar fasciitis. Passive dorsiflexion of the ankle may increase pain and indicates a tight Achilles tendon. Swelling is usually absent, but occasionally nodules from a fascial granuloma can be felt on the medial border of the fascia. A radiograph of the heel may appear normal or may show a spur projecting anteriorly from the calcaneus. Plantar fascia pain is not caused by the spur; the spur is thought to result from chronic fascial inflammation. Complete rupture of plantar fascia is uncommon, but an athlete may feel a pop on the plantar aspect of the foot while running. Swelling causes the medial longitudinal arch to take on a convex rather than a concave appearance.

The following conditions are also characterized by similar pain but are easily differentiated from plantar fasciitis: inflammation of the bursa between the calcaneus and the heel fat pad; Sever's disease; a first sacral radiculopathy; metatarsal stress fracture (calcaneal stress fractures are rare); tarsal tunnel syndrome; gout; Reiter's disease; ankylosing spondylitis; psoriatic arthropathy; and rheumatoid arthritis.

Figure 38b. Second page of a sample report.

Rest is important for effective treatment; casting is seldom necessary. Runners should avoid sprinting and uphill running, and should decrease mileage by 25-75%. Alternative forms of exercise will aid in healing and will maintain conditioning. Stretching the Achilles tendon eases the plantar fascia and helps prevent recurrence of the injury. Cryotherapy may relieve pain in mild cases, but ultrasound and electrogalvanic stimulation are not consistently effective forms of therapy. Aspirin or non-steroidal anti-inflammatory drug may decrease inflammation in the acute phase. Cortisone injections should be discouraged--pain relief is temporary and cortisone may degenerate the fascia, promoting rupture. The athlete's shoe should have a firm heel counter, good heel cushioning and adequate longitudinal arch support. Running on softer surfaces is advisable. Heel lifts, low-dye taping, and orthotics may be useful for management of the condition. Surgery should be considered for patients with heel pain persisting more than one year.

METHODS:
N/A

RESULTS:
N/A

COMMENTS:
N/A

Page 3

Figure 38c. Third page of a sample report.

After generating a printed report using the "Currently Highlighted" option, the system returns the user to the list of matches, with the next title highlighted. The user may select another title and/or return to the View/Print menu by pressing **<F2>**. After generating a printed report using the "Entire List of Matches" option, the system returns the user to the View/Print menu.

4.3.3.5 Quitting a Search. To quit a search, highlight the "Quit Search" option on the View/Print menu using ← → and press [↵]. The

system checks all modified literature for new keywords that may have been entered and displays the following message: "Please wait while the system checks for any necessary keyword updates." If the system identifies new keywords, follow the instructions in Section 4.3.3.6, Adding New Keywords. Quitting a search will clear the text or keywords specified for the search. The system returns to the main menu, from which the user may conduct another search or exit to DOS.

4.3.3.6 Adding New Keywords. At the completion of a text or keyword search, all modified records are checked for new keywords. If no new keywords are found, the system resets itself and returns the user to the main menu. If a new keyword is found, the user may add it to as many of the major topics lists as desired. In most cases, a new keyword will only be added to one major topic.

In the demonstration text search, the new keyword "plantar fasciitis" has been identified (see Figure 39). Maintenance personnel have determined that "plantar fasciitis" will be included under the major topic of Injury.

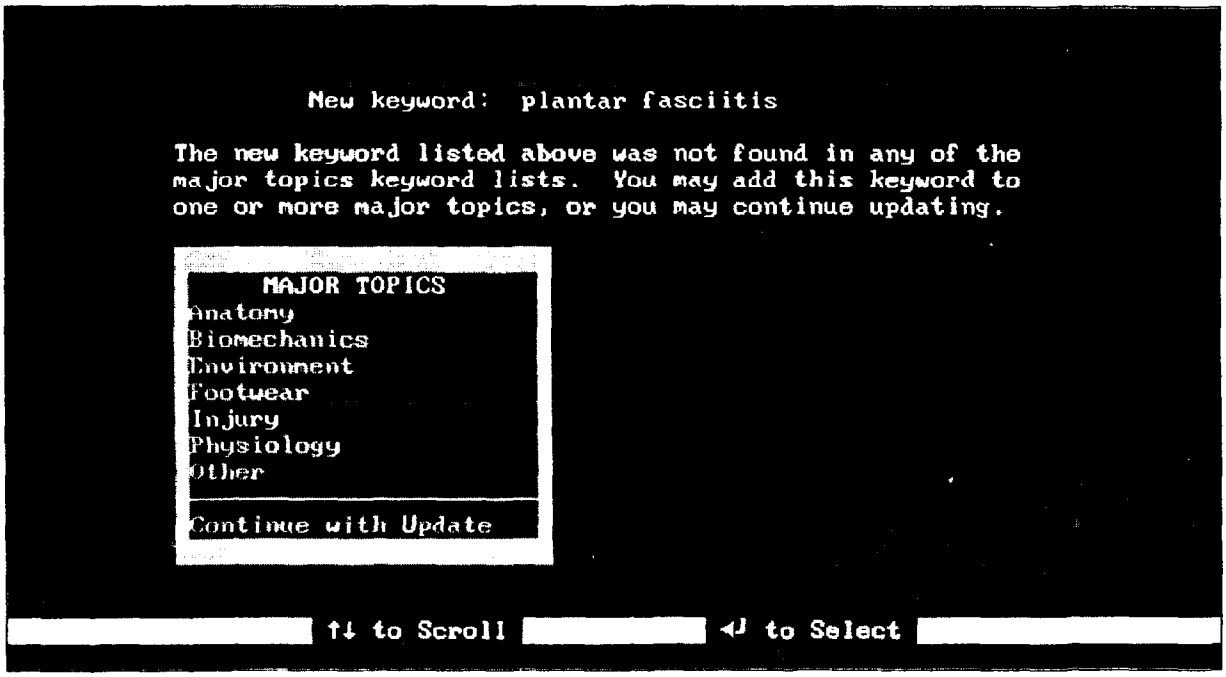

Figure 39. A new keyword identified with option to add to keyword lists.

To add a new keyword, highlight the desired major topic using ↑ ↓ and press [↵]. The system requires the user to confirm or negate the addition of a keyword (see Figure 40).

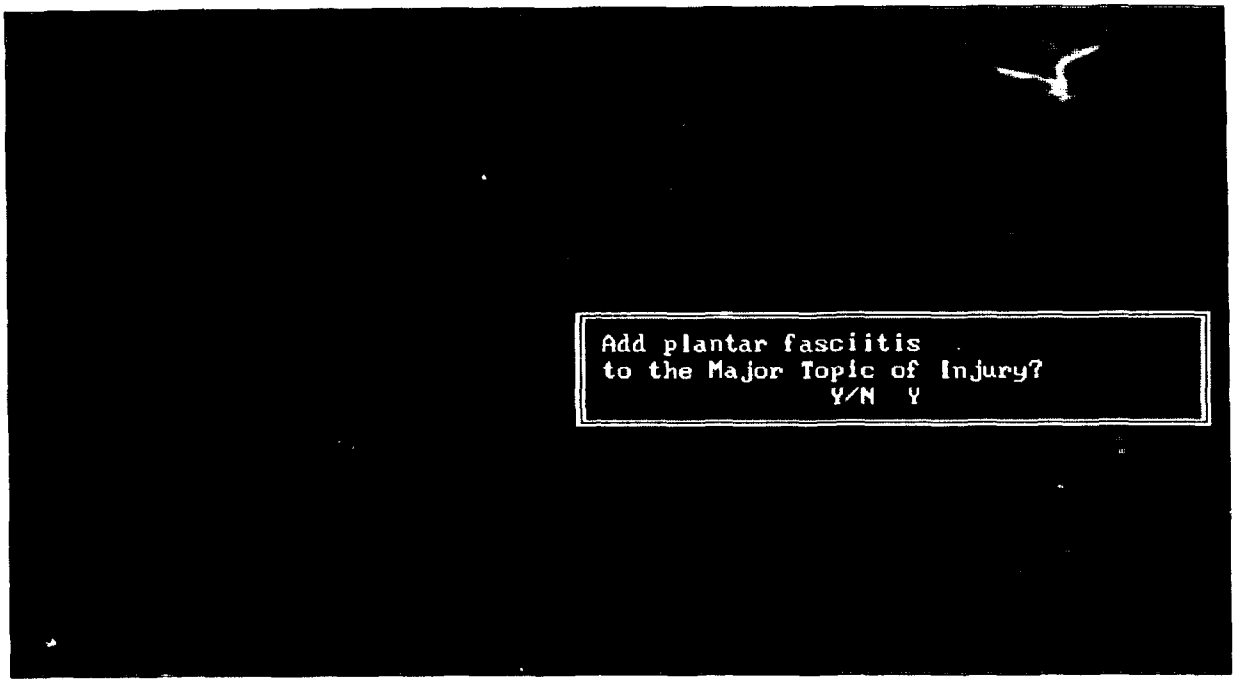

Figure 40. Confirming the addition of a keyword to a keyword list.

Upon negating the request for adding a new keyword, the user is returned to the list of major topics without the new keyword being added to the previously specified major topic. Upon confirming the request for adding a new keyword, the system adds the identified keyword to the specified major topic and returns the user to the list of major topics. The new keyword may be added to another major topic using the method described above. The system will not allow a keyword to be added twice to the same major topic.

The user may also choose to "Continue with Update," which prompts the system to identify any other new keywords. If additional new keywords are identified by the system, each will be displayed as "plantar fasciitis" was in Figure 39, and may be added to one or more major topics following the method described above. If no new keywords are identified, the system resets itself and returns the user to the main menu.

4.3.4 Updating the Database. Updating the database is an option which allows maintenance personnel to enter new records or modify existing records. Reference information and keywords are entered directly into the database using entry screens, and textual summaries are imported into the database using the Import Major Summaries menu. Ideally, all textual summaries will be written using a word processor, such as WordPerfect or MultiMate, spell-checked and edited, converted to ASCII format with a .txt file extension, and temporarily stored in the directory containing the system.

It should be noted that control characters such as those used for superscripts and subscripts in WordPerfect or MultiMate may not convert to ASCII format. Substituting control characters with convertible text is suggested. Superscripts should be substituted with the "^" character and subscripts should be eliminated. Maintenance personnel should make note of any unconvertible control characters directly on this page of the Maintenance Manual.

To update Natick's Footwear Database, highlight "Update Database" on the main menu by using ← → (see Figure 41). Upon pressing [↵], a message will appear asking the user to confirm or negate the initiation of an update session (see Figure 42).

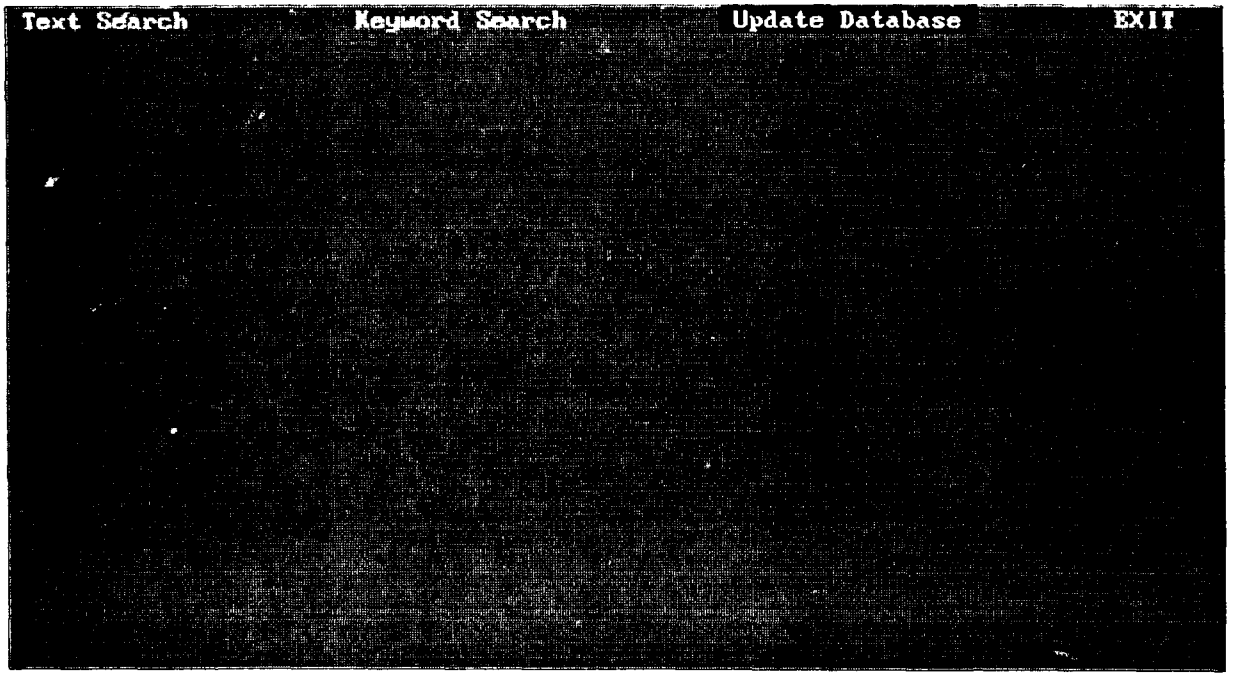

Figure 41. Main menu with Update Database highlighted.

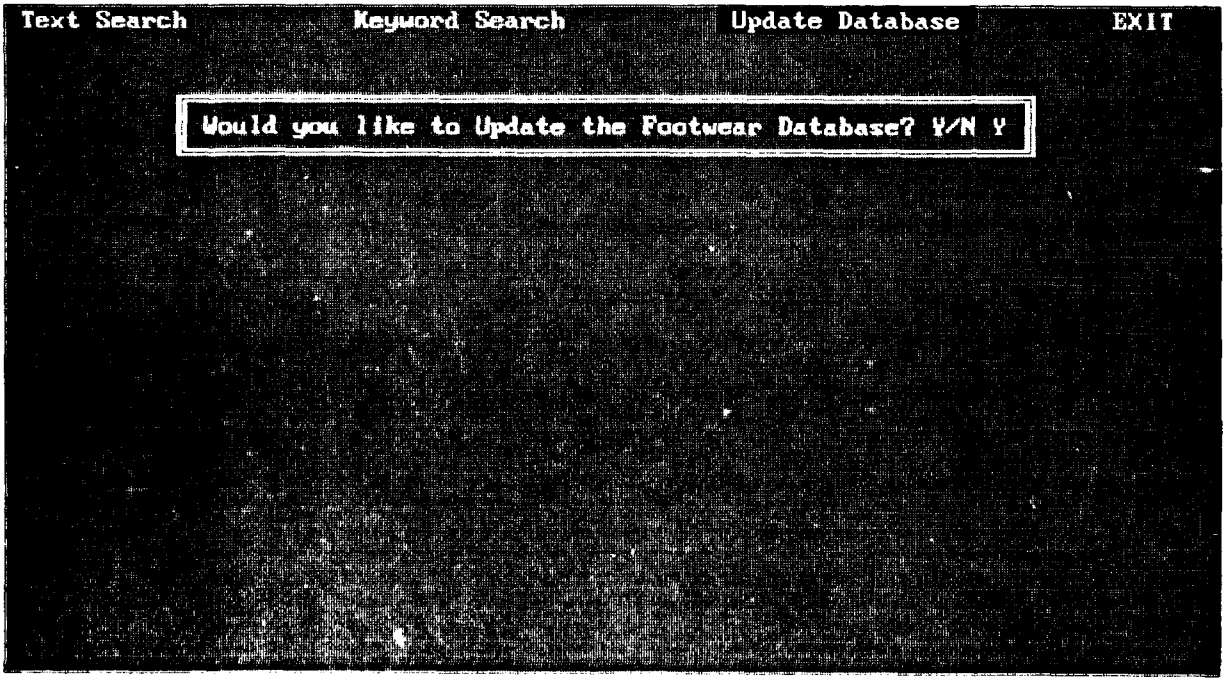

Figure 42. Confirming/negating request to update database.

Upon negating the request for updating the database, the user will be returned to the main menu. Upon confirming the request for updating the database, an "Update Duplication Check" screen asks the user if an article or a book is being edited or appended (see Figure 43).

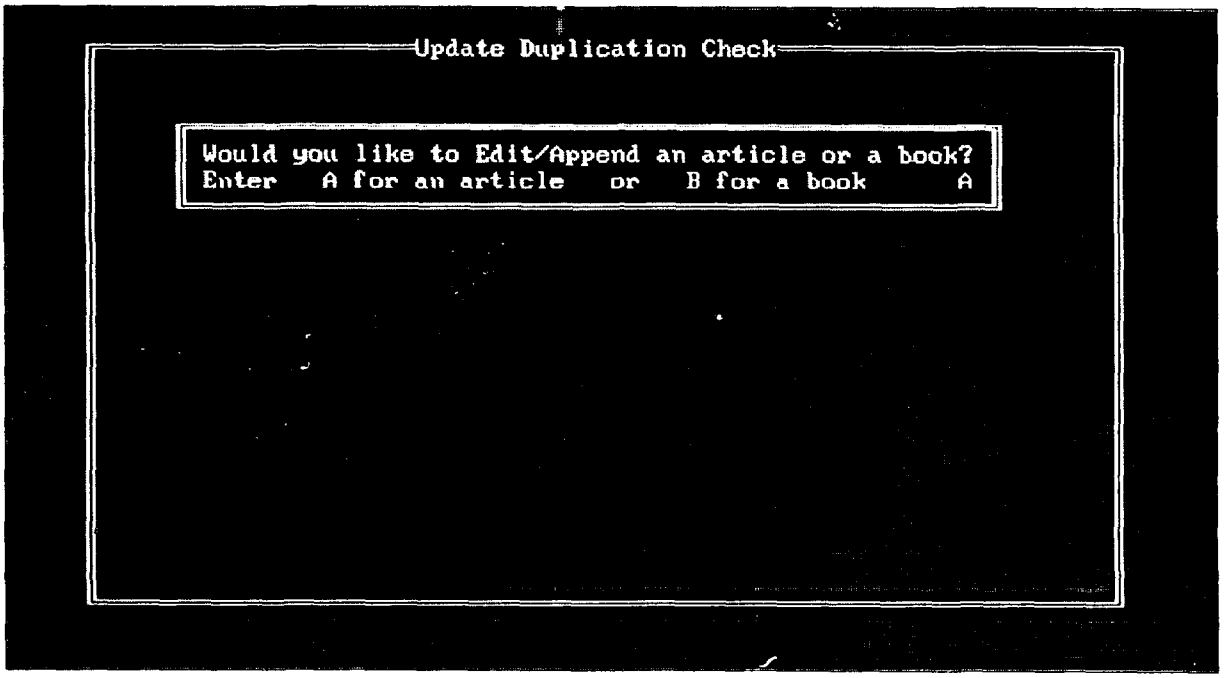

Figure 43. Choosing an article to update.

If an article is being updated, the user enters **A** and presses [↵]. Next, the user is requested to enter the last name of the first author and up to the first 60 characters of the article title (see Figure 44). If a book is being updated, the user enters **B** and presses [↵]. Next, the user is requested to enter whether the book is being updated according to the first author or the first editor. Either may be chosen if the book has both author(s) and editor(s). Upon responding, the system continues in a similar manner as when updating an article. During the entry of new records, the user must enter the text exactly as it is to be stored in the database (e.g., the first letter of the last name capitalized with all others lower case).

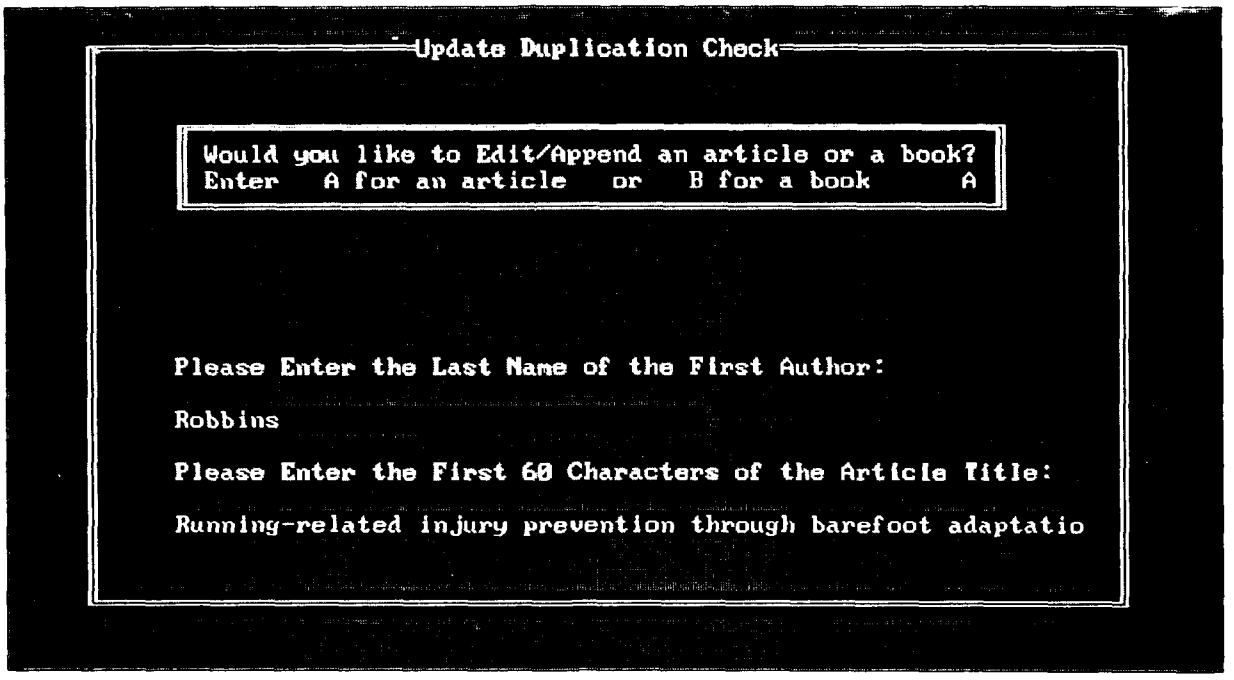

Figure 44. Entering the last name of the first author and the first 60 characters of the article title.

After the user enters the information requested for an article or a book update, the system searches the database for the author/editor and the title of the article/book that has been specified.

If a matching record is found, the system displays the entire record, including reference information, keywords, and textual summaries on three separate screens. The user has the capability to edit information stored for the record. If there is more than one record that matches the user's specifications, all matching records are displayed, and the user is allowed to scroll to a specific title to be edited. As a short cut, the user may enter fewer characters for the title at the start of an update if the record is known to exist.

If no matching records are found, the user is asked to confirm or negate the request for the addition of a new record to the database (see Figure 45).

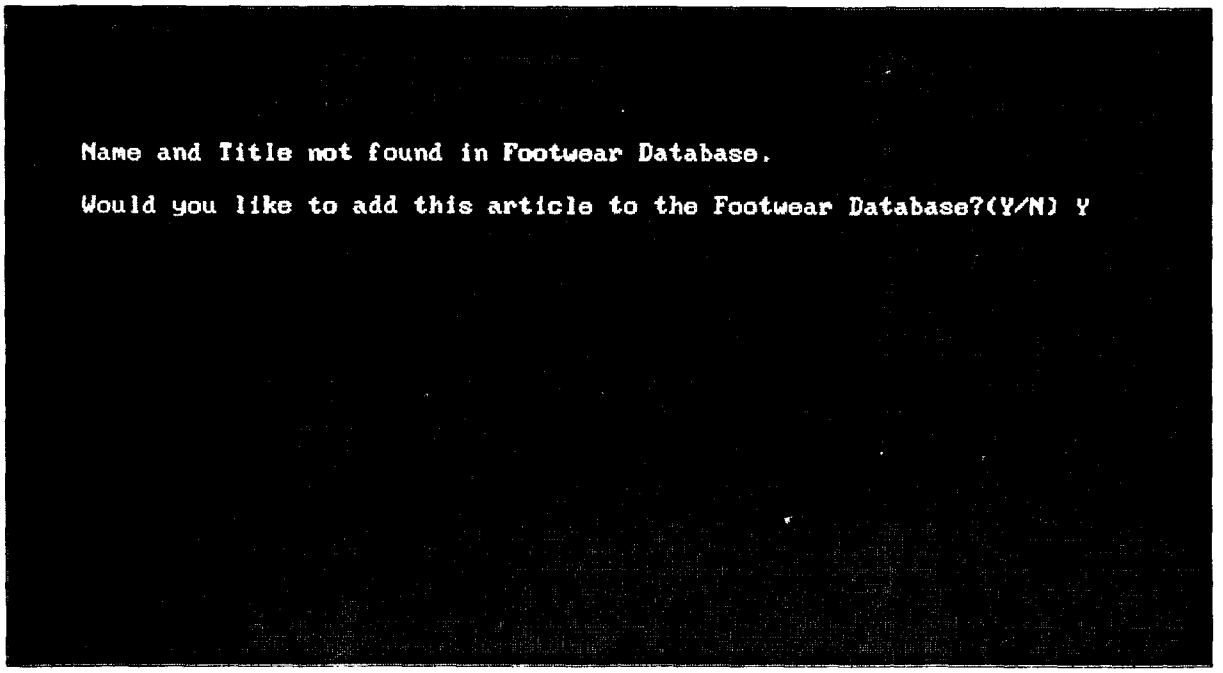

Figure 45. Confirming the request to add a new record.

Upon negating the request to add a new record, the user may either return to the main menu or continue updating. Upon confirming the request to add a new record, the system displays three entry screens for the new record. Information entered by the user at the beginning of the update session will be automatically inserted into the new record. The user is able to enter reference information for the new record, keeping in mind that appropriate words should be capitalized so that printed reports are uniform. All information, except for memo fields, should be entered directly via these three screens (see Figures 46-48).

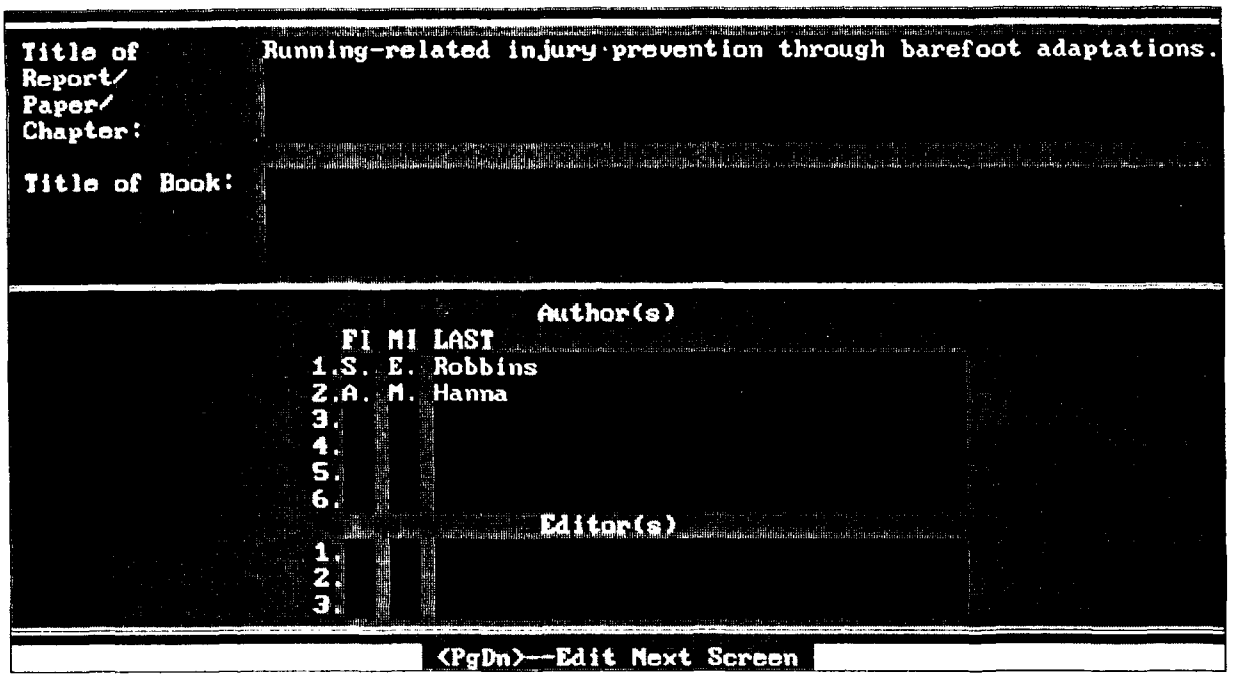

Figure 46. First entry screen of a new record.

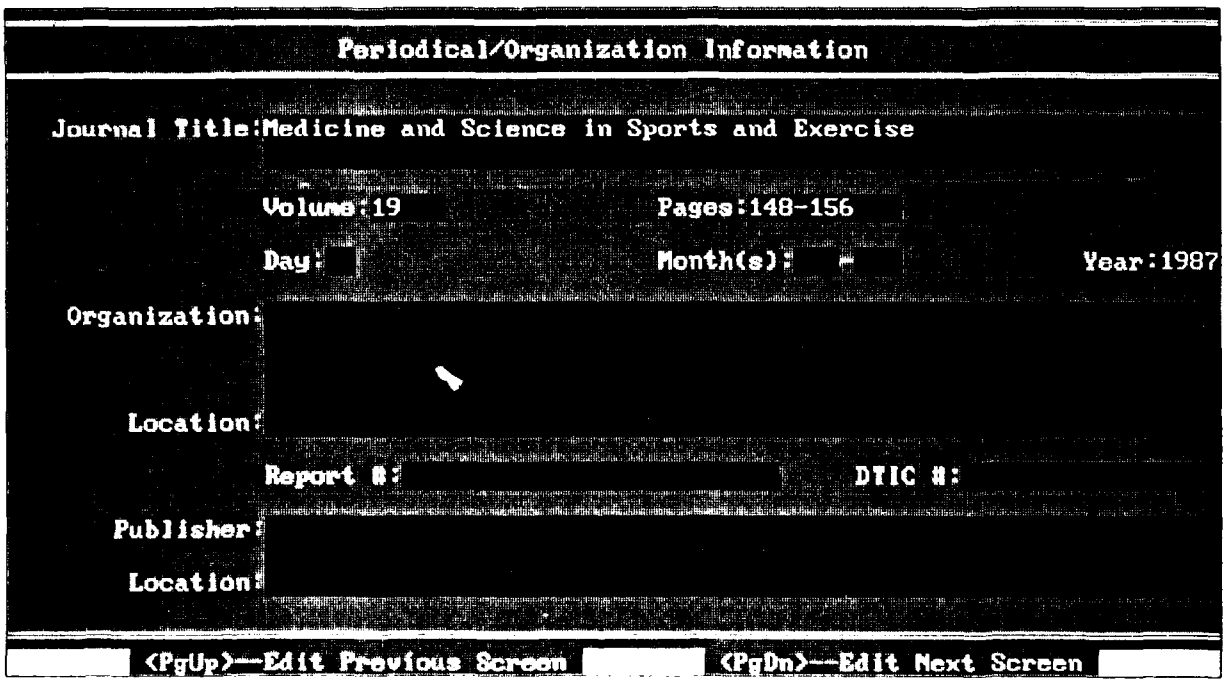

Figure 47. Second entry screen of a new record.

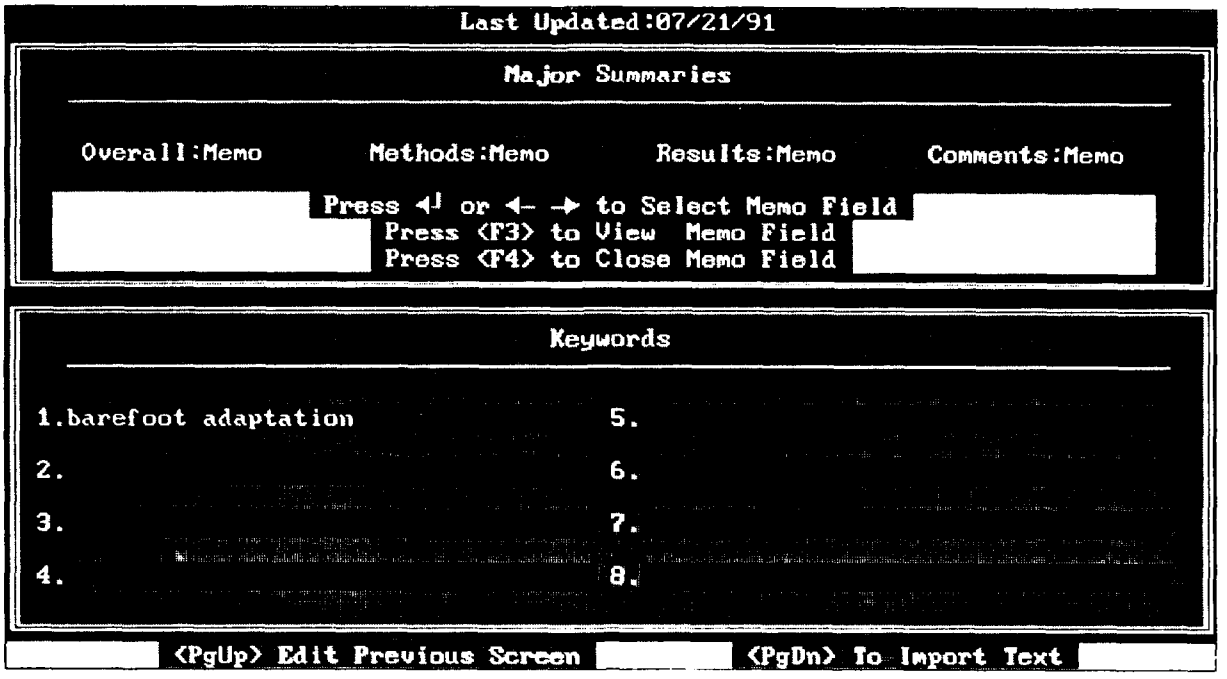

Figure 48. Third entry screen of a new record.

Guidelines for assigning keywords to records are presented in the Section 4.3.4.1, Assigning Keywords. Importing textual summaries into memo fields is described in Section 4.3.4.2, Importing Text Into Major Summaries.

4.3.4.1 Assigning Keywords. Up to eight keywords may be assigned to each record. Maintenance procedures call for the upkeep of a master keyword list which contains all valid keywords for each major topic. Careful review of this master keyword list should help identify keywords that best represent the article or book being entered. If there is a major topic or concept of the article/book that is left unaddressed by the current keyword list, maintenance personnel may declare a new keyword. The new keyword may be added to one or more of the major topics keyword lists. The procedure for adding new keywords is described in Section 4.3.4.3, Adding New Keywords.

4.3.4.2 Importing Text Into Major Summaries. Following the third screen of reference information, the user may import text into each of the summary fields (see Figure 49). Text may also be entered directly into a memo field by opening the memo field and simply typing the desired text. Since FoxPro does not presently offer spell-checking for memo fields, the import method described below should be utilized.

Figure 49. Import Major Summaries menu.

A textual summary has been written for the "Overall" memo field in the demonstration record. To import the summary, the user highlights and selects "Overall" from the Import Major Summaries menu using ↑ ↓ and presses [↵]. A screen appears prompting the user to enter the name of the text file to be imported (see Figure 50). The user is reminded of the summary to be imported and the title(s) of the current literature. If text files are stored in the Footwear Database directory, the user need only enter the filename and extension (e.g., sum14a.txt). If the text files are not stored in the Footwear Database directory, a message reminds

the user to include the path. Figure 50 shows the proper format for entering a path, but the improper spelling of the file extension.

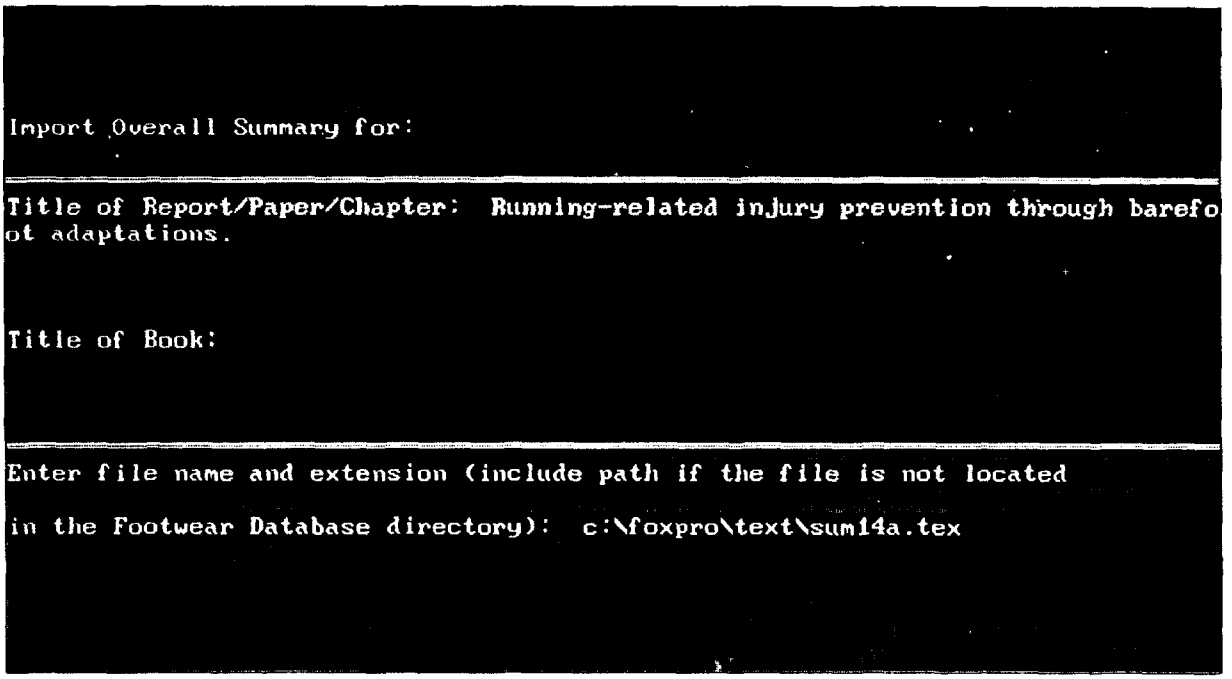

Figure 50. Entering a text file to be imported; incorrect extension used.

If the path is entered incorrectly, or if there is a typographical error in the file name or extension, the system will display an error message (see Figure 51).

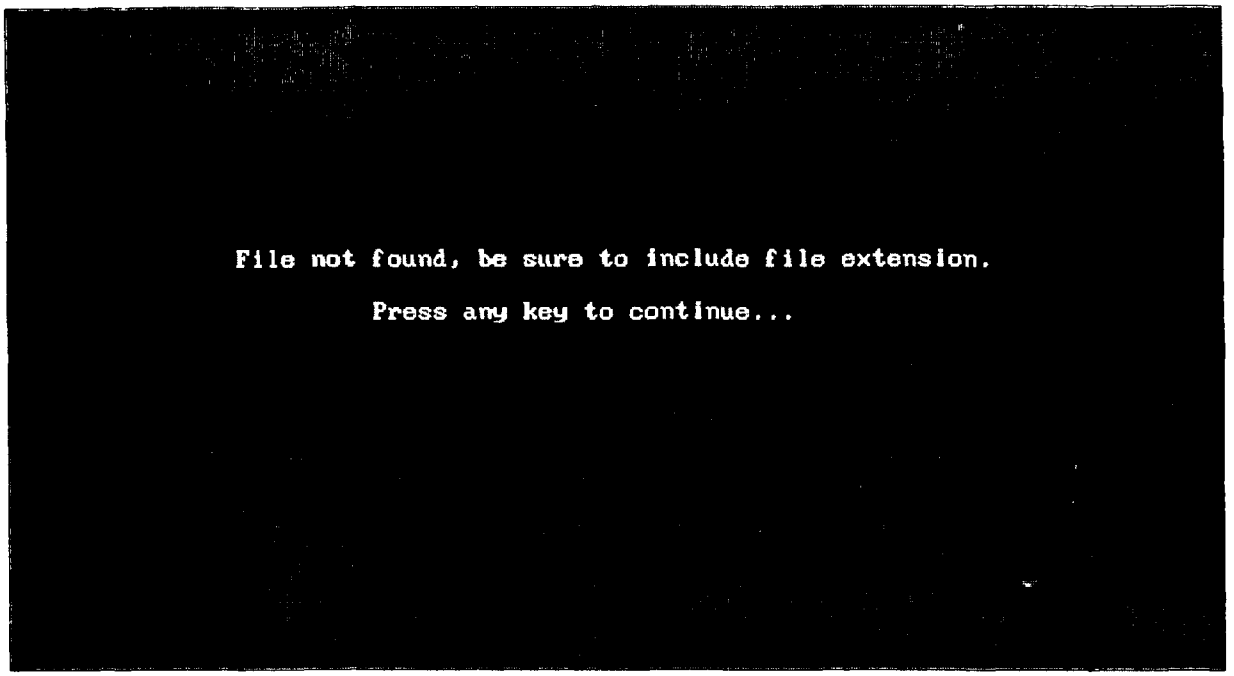

Figure 51. Error message that appears when a file is not found.

Upon pressing any key to continue, the user may select the major topic again and enter the correct text file. Note that the file entered in Figure 50 was not found due to the wrong file extension (.tex should have been .txt, as properly entered in Figure 52). Once a valid path (if necessary) and filename have been entered, the system imports the contents of the ASCII text file into the specified major summary. Using this method to import a text file overwrites any existing data stored in the memo field.

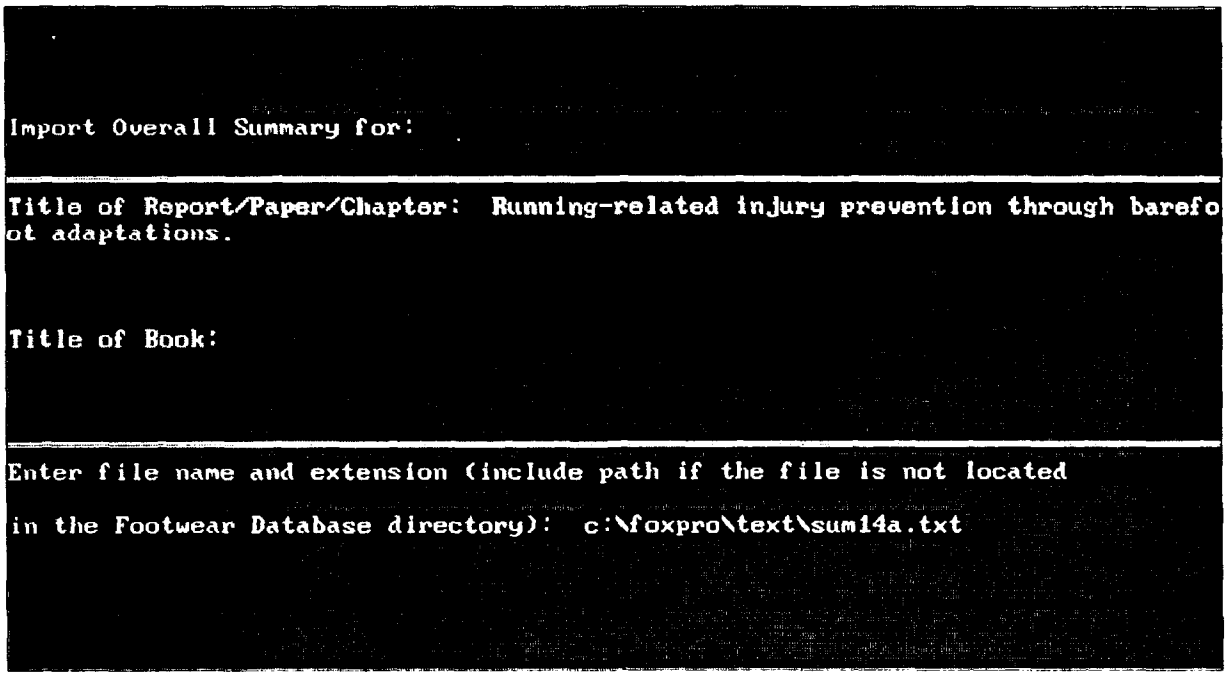

Figure 52. Entering a text file to be imported; correct file extension used.

Next, the system displays the Import Major Summaries menu to allow the user to import additional text files applicable to the current literature. These files may be imported by highlighting the appropriate summary and following the procedure described above. Once all major summaries have been imported, the user highlights "Continue with Update" using ↑ ↓ and presses [↵]. The system displays a question asking the user to confirm or negate the request to continue updating (see Figure 53).

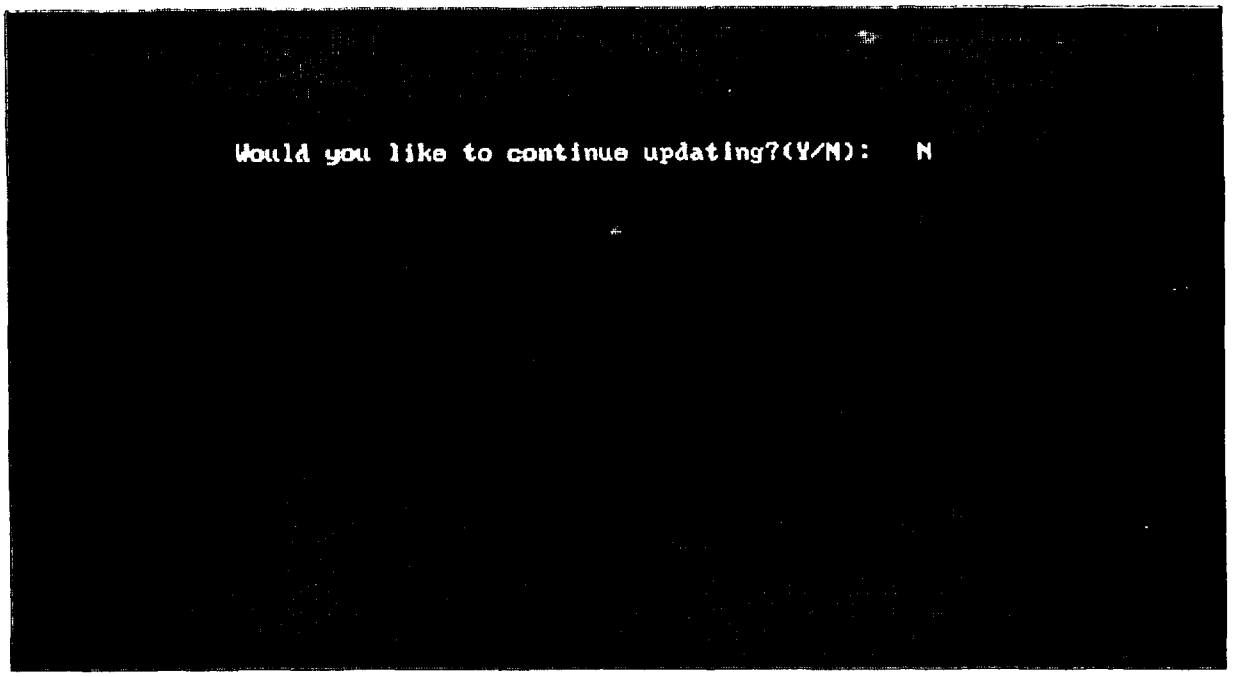

Figure 53. Negating continuation of an update session.

Upon confirmation of the request to continue updating, the system starts the new entry with an "Update Duplication Check" as shown in Figure 43. The user then continues updating as described above. It is highly recommended that the user update fewer than ten records at a time to avoid the possibility of losing data in the event of a computer or power failure. When updating more than ten records, it is recommended that the user periodically exit the system by normal means and start a new session. Upon negating the request to continue updating, the system checks all newly entered literature for new keywords that may have been entered and displays the following message: "Please wait while the system checks for any necessary keyword updates." If the system identifies new keywords, follow the instructions in Section 4.3.4.3, Adding New Keywords.

4.3.4.3 Adding New Keywords. At the completion of an update session, all records that have been edited or created are checked for new keywords. If no new keywords are found, the system resets

itself and returns the user to the main menu. If a new keyword is found, the user may add it to one or more major topics lists. In most cases, a new keyword will be added to only one major topic. In the example presented in Figure 54, the new keyword "barefoot adaptation" has been identified. Maintenance personnel have determined that "barefoot adaptation" will be included under the major topic of Biomechanics.

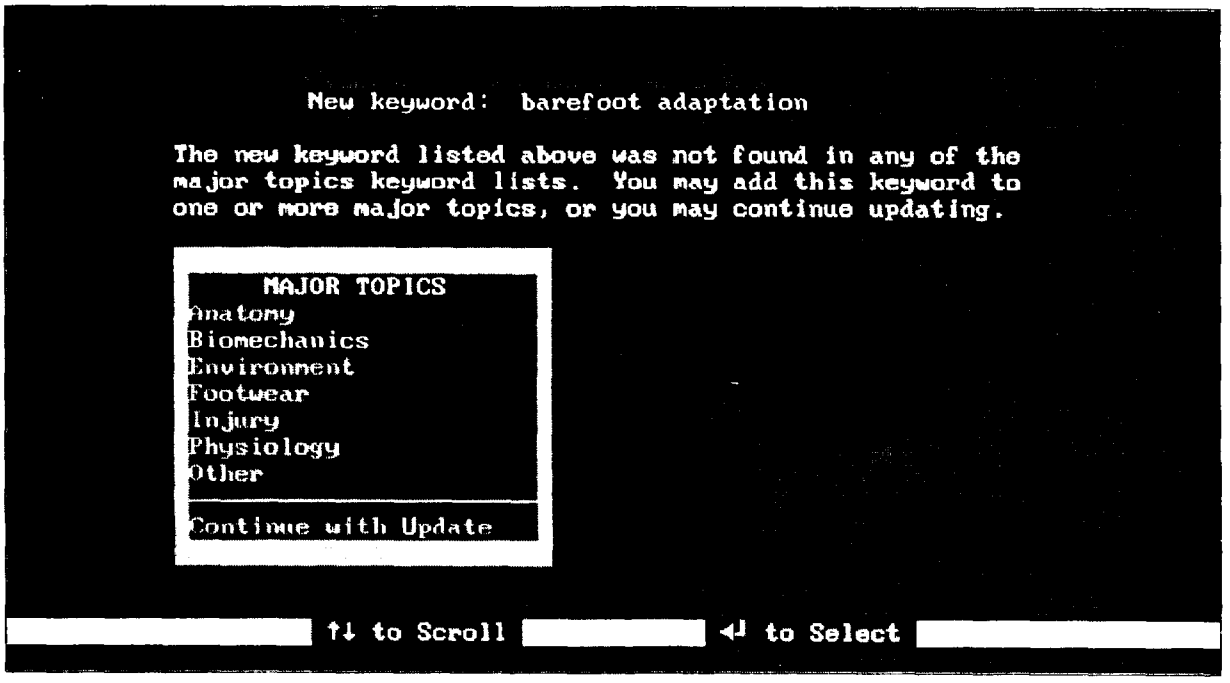

Figure 54. A new keyword identified with option to add to keyword lists.

To add a new keyword, highlight the desired major topic using ↑ ↓ and press [↵]. The system requires the user to confirm or negate the addition of a keyword (see Figure 55).

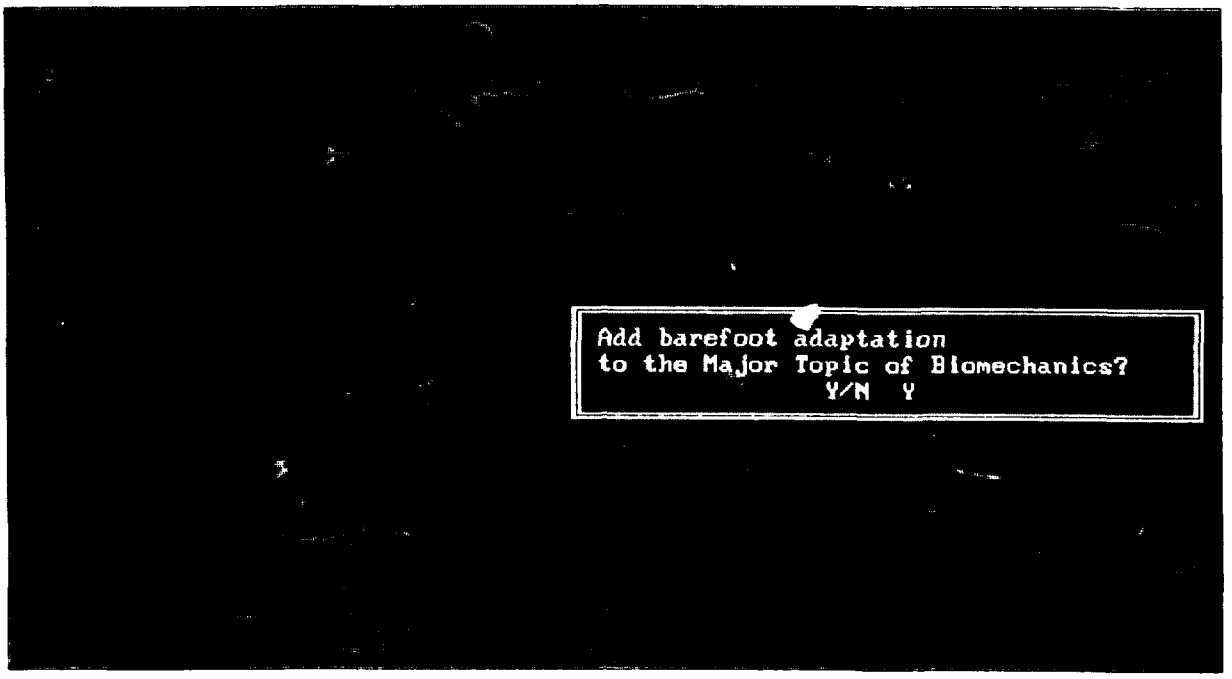

Figure 55. Confirming the addition of a keyword to a keyword list.

Upon negating the request for adding a new keyword, the user is returned to the list of major topics without the new keyword being added to the specified major topic. Upon confirming the request for adding a new keyword, the system adds the keyword to the specified major topic and returns the user to the list of major topics. The new keyword may be added to another major topic using the method described above. The system will not allow a new keyword to be added twice to the same major topic.

The user may also choose to "Continue with Update," which prompts the system to identify any other new keywords. If additional new keywords are identified by the system, each will be treated as described above. If no new keywords are identified, the system resets itself and returns the user to the main menu.

4.3.5 Exiting the System. In order to exit to DOS, highlight the "EXIT" option on the main menu using ← → and press [↵]. **THIS METHOD IS THE ONLY PROPER WAY TO EXIT THE SYSTEM.** Exiting the

system by any other method such as soft booting or powering down the system will result in error messages during subsequent operation of the system. Assistance for dealing with such messages is located in Appendix C.

Upon accepting the "Exit to DOS" menu option, the system allows the user to automatically backup modified files onto floppy diskettes. Instructions for doing so are presented below along with descriptions of what the automatic backup accomplishes. It should be noted that this backup procedure is designed to backup only part of the system onto diskettes already containing the files being updated. When necessary, a complete copy of the system should be made using the DOS copy or diskcopy commands.

Initially, the system displays a question asking the user whether or not to backup the system (see Figure 56).

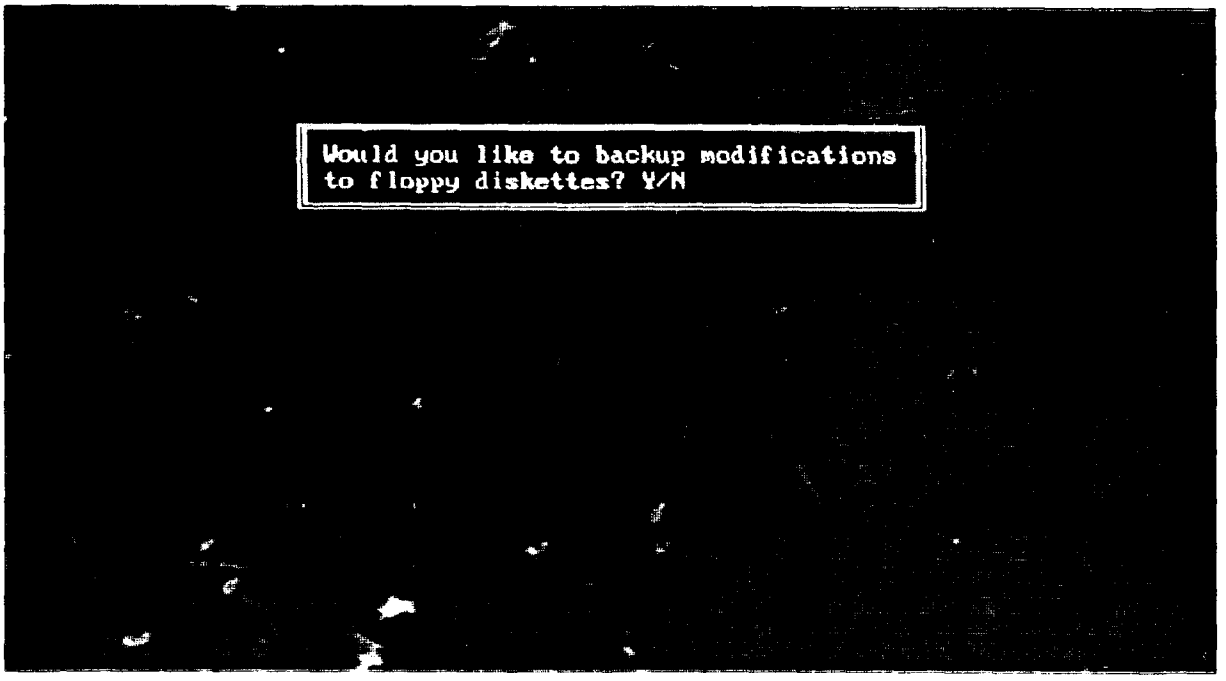

Figure 56. Backup option displayed before leaving the system.

Negating the request for backup continues normal shut down procedures and, within a few seconds, the user is returned to the DOS prompt. Upon confirming the request for backup, the system

displays a screen asking the user to enter the drive designators that represent the computer system in use. The user enters the hard drive on which the system is installed and the floppy drive to which the system is to be copied to (see Figure 57).

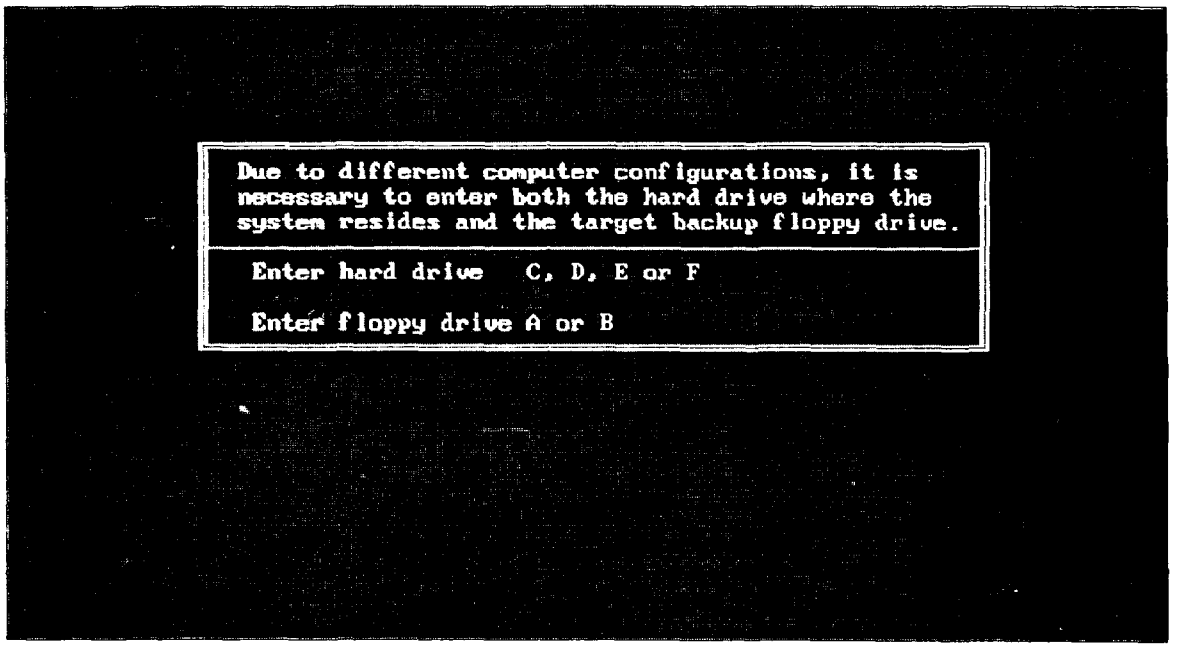

Figure 57. Entering hard and floppy drive designators.

The following floppy diskettes are required for backup procedures: the Keywords Diskette, all current Database Diskettes, and all current Text Diskettes. It may be necessary to have on hand extra formatted floppy diskettes if either the database or text file has grown to a size requiring additional storage space since the previous backup was performed. Sequential labels for additional diskettes are stored with the backup software for Natick's Footwear Database.

Upon entering the hard and floppy drive designators and pressing [↵], the system prompts the user to insert the Keywords Diskette and to press [↵]. Inserting the wrong diskette will repeat the prompt for the correct diskette. When the correct diskette is inserted, all files that make up the system's major

topics keywords lists are copied to the Keywords Diskette. When copying is completed, the system displays a message informing the user to: "Follow the DOS prompts for the appropriately numbered backup diskette in the series of Database Diskettes. ***** Insert Database Diskette #1 in a: ***** Strike a key when ready...." After pressing any key, DOS will prompt the user to insert the first backup diskette in the database series with a message similar to: "Insert backup diskette 01 in drive A: Warning! Files in the target drive A:\root directory will be erased. Strike any key when ready." Upon inserting the correct diskette from the database series, the floppy diskette is erased and the file is backed up. If the file does not fit on one diskette, another will be prompted for. Upon completion of backup for the database series of diskettes, the system prompts for the Text Diskettes using messages similar to those presented above.

Backup files stored on the Database and Text Diskettes are the same names, but contain different information. Therefore, the backup procedure does not recognize the difference between Database Diskette #1 and Text Diskette #1, but does recognize any other incorrect diskette. Part of the DOS backup command calls for the target diskette, in this case the floppy diskette, to be erased before a file is backed up. **INSERTING AN INCORRECT DATABASE OR TEXT DISKETTE #1 MAY ERASE AND SUBSEQUENTLY BACKUP A FILE TO THE WRONG DISKETTE.** If this mistake occurs, simply run the backup procedure again, paying careful attention to the series of diskettes being backed up. On-screen prompts are displayed readily at the start of each backup series and diskettes are clearly labelled to help alleviate this potential problem.

Upon completion of the backup, the system continues with normal shut down procedures and, within a few seconds, the user is returned to the DOS prompt.

SECTION 5. REFERENCES

Poole, P. M., Bensel, C. K. and Rosenstein, R. M. (1992). User manual for Natick's Footwear Database (Tech. Rep. NATICK/TR-92/016). Natick, MA: U.S. Army Natick Research, Development and Engineering Center.

Department of the Army. (1986). Size tariff for clothing, equipage and footwear (Supply Bulletin SB 10-523). Washington, DC: Department of the Army, Headquarters.

APPENDIX A
Suggestion and Comment Form

Appendix A. Suggestion and Comment Form

The space provided below may be used to inform database maintenance personnel of literature not presently included in the database that you feel should be. Please be sure to provide the actual article reprint or book being suggested. The space may also be used to report trouble you experienced while operating the system and/or suggestions for improving the system.

Completed forms can either be left at the PC designated as Natick's Footwear Database System, or if the system is being used on another PC, forms can be returned to personnel responsible for distributing the system software. Thank you for your time and cooperation.

Name

Organization and Phone #

APPENDIX B
Installation Instructions

Appendix B. Installation Instructions

Hardware and software requirements, which are outlined in Section 2.2.1 and Section 2.2.2 of this manual, should be carefully adhered to.

Before installing the system, it is necessary to check the contents of a DOS file called config.sys. The file may contain files=*xx* and buffers=*xx* statements, where *xx* is a variable number. In order for Natick's Footwear Database to run properly, the files statement should equal at least 40 and the buffers statement should equal at least 40. If the statements are already set for at least 40 each, leave the file as is and continue with the following installation instructions. If the statements are less than 40, use a text editor to set them to 40. If there are no files or buffers statements, add each statement on a new line of the config.sys file by using a text editor. Be sure not to delete or modify any other lines of the config.sys file (if any are present) -- they are there for a reason. It should be noted that setting either or both of these statements to a number higher than 40 will not improve the efficiency of the system and may even decrease efficiency. Existing config.sys files with statements higher than 40 should be left as is, however, because the higher settings may be necessary for the proper operation of other applications.

After all hardware and software requirements and configurations have been met, installation of the system may be initiated with the install.bat batch file. Due to different hard and floppy drive configurations of various computer systems, it is necessary to enter the source and target drive designators after the "install" command. To begin, insert system diskette #1 into desired floppy drive and type appropriate command as shown in the table below (other drives may be substituted if necessary).

What To Type:	What Will Happen:
a:install a: c:	Installs system from floppy drive A: to hard drive C:
b:install b: c:	Installs system from floppy drive B: to hard drive C:
a:install a: d:	Installs system from floppy drive A: to hard drive D:
b:install b: d:	Installs system from floppy drive B: to hard drive D:

After entering the appropriate batch file command, the user will be prompted for each diskette that makes up Natick's Footwear Database System. Note that, as the size of Natick's Footwear Database increases, so may the number of diskettes required to store the system. At the time of publication, there were 4 diskettes containing system files, 1 diskette containing keywords files, 1 diskette containing the footwear database file, and 2 diskettes containing the footwear text file. The installation batch file is designed to accommodate additional diskettes as the size of the system increases. The contents of each diskette are listed below.

Diskette:	Contents:	
System Diskette #1*	back.bat	
	foxpror2.pak	
	foxswap.com	
	foxunpak.exe	
	install.bat	
	install2.bat	
System Diskette #2	foxprort.exe	
System Diskette #3	keydet1.frx	textdet1.frx
	keydet2.frx	textdet2.frx
	keyref1.frx	textref1.frx
	keyref2.frx	textref2.frx
	foxuser.dbf	foxuser.fpt
	foot3a.prx	foot3b.prx
	foot4a.prx	foot3.fky
	foot.bat	
System Diskette #4	foot3.fxp	
	foot4.fxp	
	run.fxp	
Keywords Diskette	anatomy.dbf	anatomy.idx
	biomech.dbf	biomech.idx
	environ.dbf	environ.idx
	foot.dbf	foot.idx
	injury.dbf	injury.idx
	other.dbf	other.idx
	phys.dbf	phys.idx
Database Diskette #1**	backup.001	control.001
Text Diskette #1***	backup.001	control.001
Text Diskette #2***	backup.002	control.002

* When installed, install.bat is not copied onto the hard drive. In addition, foxpror2.pak is uncompressed onto the hard drive as two files (foxprort.rsc and foxprort.ovl) using foxunpak.exe.

** When installed, these files are restored to a file called footwear.dbf on the hard drive.

*** When installed, these files are restored to a file called footwear.fpt on the hard drive.

Automatic installation of the four Systems Diskettes and the Keywords Diskette employs the use of the simple DOS copy command, whereas automatic installation of the Database Diskette(s) and Text Diskettes employs the use of the more involved DOS restore command.

Diskettes containing files installed with the copy command are prompted for with a message similar to: "Please insert System Diskette #1 in drive A: Strike a key when ready...." Upon entering the correct diskette and pressing any key, the files are copied automatically, and the system prompts the user for the next diskette in the series. If the user inserts an incorrect diskette, the prompt for the correct diskette is repeated. When the correct diskette is inserted, installation proceeds with the next diskette in the series.

Files installed with the DOS restore command are those that may eventually, if not already, occupy more than one 5 1/4 inch double sided, double density diskette. Diskettes containing these types of files (i.e., Database and Text Diskettes) are prompted for with a message similar to: "Follow the DOS prompts for the appropriate numbered backup diskette in the series of Database Diskettes. ***** Insert Database Diskette #1 in A: ***** Strike a key when ready...." After pressing any key, DOS will prompt the user for the first backup diskette in the series with a message similar to: "Insert backup diskette 01 in drive A: Strike any key when ready." Upon inserting the correct diskette from the appropriate series, the file is automatically restored, and the user is prompted for the next diskette in the series or a new series is started. If the user inserts an incorrect diskette, the prompt for the correct diskette is repeated. When the correct diskette is inserted, installation proceeds with the next diskette in the series. When the entire system has been loaded, DOS returns the message: "Installation of Natick's Footwear Database is complete. Type 'foot' to begin."

APPENDIX C
Alphabetical Listing of Error Messages

Appendix C. Alphabetical Listing of Error Messages

The following messages are not covered in the body of the manual. Most will only occur if proper operating procedures are not followed, or if there is trouble with the hard disk or operating system of the host PC.

Bad command or filename

This is a DOS error that may occur when attempting to start up the system. Check footwear database directory for the batch file called foot.bat. If not there, check for *.bat. If there is another .bat file, try typing it followed by a [↵]. If there are not other .bat files, follow instructions in Appendix B and reload the system. This error may also occur while trying to install the system on a computer that is supported by DOS version 3.3 or earlier.

C:\path\filename.ext already exists, overwrite?

This type of error is due to an improper shut down of the system. Note that the drive, path, file name and file extension will vary depending on the file in question. The user should respond "Yes" to the overwrite request. The files being overwritten are of a temporary nature and would have been deleted if the system had been shut down properly.

Cannot create file

The operating system has returned an error to FoxPro indicating that the new file cannot be created. The inability to create a new file is usually the result of a full disk or directory. You may receive this error while conducting either a text or a keyword search. Temporary files created by the system during searches are not obvious to the user because their creation is hidden. If this error occurs, cancel the operation and check the hard disk for available space.

File does not exist

The file you have specified does not exist. Try entering file again, being careful to include a path if the text file for import resides in a directory other than Natick's Footwear Database directory. Also, be sure to include the file extension.

File read error

An error was returned by the operating system while FoxPro was attempting to read a file. System files that are unable to be read may reside on a bad sector of the hard disk. Consult DOS manual(s) for host PC.

File write error

An error was returned by the operating system while FoxPro was attempting to write a file. Most often, this error is the result of an attempt to write to a write-protected diskette, but may also be the result of a bad sector on the hard disk. Consult DOS manual(s) for host PC.

Index does not match database file

The index expression for the current index uses variables which are not contained within the current database. This error should not occur unless the system has been corrupted; try reloading system if error persists after canceling the operation and rebooting.

Insufficient memory

There was not enough memory for FoxPro to complete an operation. Cancel the operation and try rebooting and/or removing any memory-resident programs that may currently be installed on host PC.

Internal consistency error

An internal FoxPro table has been corrupted. If this error occurs, inform personnel responsible for maintaining the database; contacting the FoxPro Technical Support Line may be necessary.

Invalid character in command
A source line of code contains an invalid character. This is probably caused by corruption of the system files. Reloading of the system from uncorrupted disks is recommended.

Invalid drive specification
The floppy and/or hard drive specified during installation or backup of the system is not valid. Abort the operation and try again with correct drive designators.

Invalid or missing resource file
Either the FoxPro resource file (FOXPRORT.RSC) could not be found (in the system directory or along the DOS path), or the resource file found has been corrupted. Try reloading uncorrupted copies of the system disks.

Invalid directory
Check to be sure the system was in fact installed in the directory the user is trying to change to. The system may have been installed in a directory other than footwear or it may have been removed from the host PC all together.

Memo file is missing/invalid
An attempt was made to use a database file whose associated memo file (.DBT or .FPT) has been deleted, corrupted or cannot be found. Try loading an uncorrupted copy of the system disks.

Menu is already in use
An attempt has been made to activate a menu that is already active. This error occurs if the keys are quickly and erratically pressed. Choosing "ignore" when this error occurs will solve the problem.

No memory for buffer, file map, or filename
It is impossible to allocate memory for a buffer or a FoxPro internal resource. This message is very unusual and will occur

only in situations where available memory is extremely limited. Consider adding memory to the host PC or removing some memory resident programs to give FoxPro more working memory.

Not enough memory to use database
There was not enough memory to open an additional database. Try removing some memory resident programs to give FoxPro more working memory.

Not ready error reading drive A
Abort, Retry, Fail?
DOS returns this error when a diskette is not inserted in the floppy drive specified during installation or backup of the system. To continue the operation, insert appropriate diskette in designated drive and press "R" for Retry. To cancel the operation, press "A" for Abort.

OS memory error
There is a problem with your DOS free memory chain. Consult DOS manual(s) for host PC.

Popup is already in use
An attempt has been made to activate a popup that is already active. This error occurs if the keys are quickly and erratically pressed. Choosing "ignore" when this error occurs will solve the problem.

Position is off the screen
A row or column number specified in the system is larger than the number of rows or columns on the screen, window or printer. Operation of the system on a PC that has a monitor smaller than standard size or a printer with width smaller than 8 1/2" may cause this error.

Printer not ready. Retry?

The printer device specified is currently not accessible or the printer may be off line. Be sure printer is on line and ready for data, and then choose to continue with the request. Please note that this error also occurs during the cancellation of a print job and should be treated as specified in the appropriate section of this report.

Record is not in index

A database for a keyword list in use has been modified without the index having been active or reindexed. Choosing "ignore" in response to this error should solve the problem.

Run/! command failed

Most often this error message is a result of insufficient free memory to support the execution of a DOS command from within FoxPro. This will likely occur while the system is resetting itself after a search or while the backup option of the development version is being run. It is suggested that the user cancel the operation and follow the guidelines below.

Firstly, the command.com file must be accessible via the DOS environment variable COMSPEC. Secondly, memory resident programs, such as shells loaded prior to start up of the database, should be cleared from memory before trying the operation again. Due to canceling operation of the database during a search, a subsequent search may generate an error message that states: "C:\path\filename.ext already exists, overwrite?" Simply follow suggestions listed for this error message.

Too many files open

FoxPro has attempted to open more than its internal limit of files. This may be caused by the config.sys files statement not being set high enough. Choose to "cancel" the request and check DOS config.sys file (see Appendix B, Installation Instructions).

Unable to create temporary work file(s)

The database system has attempted to create temporary work files and was not permitted by the operating system. This is caused by a full directory or a permissions problem concerning access to the system directory.

APPENDIX D

Keywords by Major Topic as of December 16, 1991

Appendix D. Keywords by Major Topic as of December 16, 1991

ANATOMY
anatomy
ankle anatomy
anthropometry
foot anatomy
knee anatomy
lower extremity morphology
plantar fascia

BIOMECHANICS
barefoot adaptation
biomechanics
electromyography
energy transfer
load
modelling
sensory attenuation

ENVIRONMENT
altitude
cold
heat
surface
terrain

FOOTWEAR
hot weather combat boot
last
leather combat boot
orthotics
running shoe
shoe construction
shoe materials
shoe properties
shoe testing
socks

INJURY
Achilles tendon disorders
ankle injury
bursitis
cavus foot
chondromalacia
compartment syndrome
crush injury
foot injury
foot powder/antiperspirants
fracture
friction blister
frost bite
iliotibial band syndrome
injury
injury rates
knee injury
lower extremity disorders
muscle soreness
neural injury
orthotics
plantar fasciitis
planus foot
rheumatic conditions
shin splints
stress fracture
stretching exercises
trench foot

PHYSIOLOGY
cardiorespiratory fitness
energy economy
fiber composition
oxygen consumption

OTHER
military training
physical training
running